The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. VI., NO. 149 APRIL 22, 1922 Prepaid Annual Subscription: United Kingdom, £1.1.0; Abroad, £1.6.0.

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to "The Chemical Age" is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.

Editorial & General Offices—8, *Bouverie Street, London, E.C.4.*
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (5 lines).

The Safeguarded Industries

THE debate just before the Easter adjournment of the House of Commons on the Safeguarding of Industries Act was altogether a faint-hearted and unreal affair. Under the Speaker's ruling it was impossible to discuss the principle of the measure, and the criticism and defence had to be restricted to its administration. The speeches were fettered by these limitations, and the performance has been appropriately described as "shadow-boxing." The debate might very well have begun with the point on which it ended, namely, Mr. Seddon's reminder that the measure was the result of promises made to British manufacturers during the war with the object of encouraging them to provide goods for which we had previously depended on Germany. At the time when German supplies were cut off and we had nothing or nearly nothing to replace them, the readiness of British manufacturers to step into the breach was enthusiastically welcomed. The air seemed full of assurances that the country would stand by them and give them a fair chance if only they would come to the country's aid. But the public memory is notoriously short; to-day these pledges appear in many quarters to have been already forgotten. We should like, if the whole matter is now to be reopened, to reopen it at this point—whether the people who, in response to a national call, invested their money and enterprise in the development of existing or the creation of new industries, on the assurance that they would be safeguarded against foreign competition for a fixed period, are now to be deserted. This is a simple issue, ethical rather than political in character, and one would like to see it frankly faced.

The debate itself was straggling and inconclusive. Mr. Asquith on the one side made the most of all the difficulties of administration; Mr. Baldwin on the other made the least of them and the most of the benefits. On this last point he was able to give testimony which should count for something even with admitted opponents. Reports he had received from the fine chemical industries were distinctly cheering. Firms which, when the Act became operative, were discharging men and working short time, are now fully employed. Most important of all was his confidence that when the Act had run its allotted time many of these industries would be able to stand on their own merits. That, of course, is the essential purpose. We have repeatedly emphasised the danger, common to all protective systems, of relying upon outside safeguards instead of on intrinsic efficiency. Those who still hold to the general theory of Free Trade are sometimes twitted with inconsistency in supporting temporary safeguarding measures. But Free Trade is no more a divine law than any other political system. It is adopted by this country simply because it pays, and in special circumstances it may be modified or amended to suit special circumstances which may arise. Such special circumstances arose during the war and they have not yet disappeared. Ultimately our industries must depend on their own efficiency, and all that the Act provides is a limited period of grace to enable them to become efficient.

In the meantime inconveniences fall on certain classes. That is inevitable. We should be thankful if this measure were the only inconvenience which the war had left behind. The simple duty before the country is to carry out its pledges to British manufacturers, to assist the new industries as far as possible towards the stage of independence, and in return for this temporary assistance to expect them to justify their own existence. It is not an occasion for violent feeling on one side or the other, but merely one of those typical compromises between theory and practice, at which the Englishman is supposed to be so good.

German Combine Rumours

A CORRESPONDENT, recently returned from a tour of chemical works in Germany, reports that rumours are common there respecting working agreements between German and Belgian interests, and to a less degree between German and French interests, with a view to restricting competition and sharing profits. The other day a Yorkshire journal circulated a report of a commercial alliance between the leading French dyestuffs company, La Compagnie Nationale des Matières Colorantes et des Produits Chimiques, and the German "I. G." The terms of the compact looked rather impossible at the time, and it was no surprise to find the report accepted with great reserve here, and to hear later from Berlin that it is also discredited there. In the United States very much the same kind of thing is taking place in reference to the potash industry. There the advocates of a native potash industry openly complain of German interests deliberately underselling United States producers with the object of destroying their industry. In this they seem to have succeeded, for potash plant representing a total investment of over 28 million dollars is now shut down. The native producers, it is stated, "cannot sell a pound of potash on the American market at any price." Recently we drew attention to a contract under which thirty-four American concerns dealing in potash as middlemen or as fertiliser manufacturers agreed to purchase a minimum of 75 per cent. of their requirements from the German syndicate. Later the same firms entered into a similar agreement with the French potash syndicate for the supply of the remaining 25 per cent. of their requirements. A New York contemporary calls attention in pointed terms to the similarity in words and conditions of the two contracts, and suggests that it supplies strong evidence that the terms of each contract were "dictated by the same controlling minds in Berlin." So far no confirmation of these reports as to German-French understandings has appeared. It is quite possible they may be without foundation.

At the same time it is significant that M. Saint-Gall, in a contribution to the current issue of *Chimie et Industrie*, should speak of a German-French potash combine as a distinct possibility, and even hint broadly at the mutual advantages it might secure. After dealing with the growth of potash combines in Germany, especially the Wintershall Syndicate, which aims at the control of the United States potash market, he adds: "If Germany cannot attain her ends by internal combination, then she may act in concert with us, astonishing as that may seem; hence the rumour, now current, of an eventual Franco-German alliance in the potash industry. If the day really dawns when the industries of France and Germany join hands in friendship, there can be no doubt whatever as to the great advantages that will accrue to both." The matter has evidently gone too far to be ignored, and some authoritative statements from the French side would be welcome. It seems certain that Germany is prepared to give liberal terms to foreign interests which are prepared to work with her, and one hears of negotiations intended to lead to working arrangements with British concerns.

Sulphur Dioxide for Sewage Treatment

THE employment of sulphuric acid for the recovery of grease from sewage and various effluents is well understood in this country, but the operation of such processes received a set-back during the war owing to the demand for acid for other purposes, although as a substitute effective use was made of nitre cake, which was available in fairly large quantities. The addition of acid to sewage as a means of precipitating suspended solids and separating fatty acids has been practised at a number of places in this country for some time, and one notes that considerable interest has lately been taken in America in the Miles process, which utilises sulphur dioxide in lieu of sulphuric acid. It would seem that there is no actual novelty in the use of sulphur dioxide, for it appears to have been employed at Bradford but abandoned in favour of sulphuric acid. Mr. F. W. Mohlman, however, indicated in a paper he recently contributed to the Engineers' Society of Western Pennsylvania that the defects which beset the process as originally conceived have now been overcome, and that many advantages over the better known sulphuric acid method are given by the Miles process. It may be as well to recall that when an acid is added to sewage, several reactions take place. According to the law of mass action the bicarbonates will be decomposed first, liberating small amounts of carbon dioxide. Then the insoluble soaps are more or less changed to free fatty acids—oleic, stearic, and palmitic—which rise to the surface and mechanically separate from the liquid as an oily layer, if they are present in concentrated form and the sewage is heated; but which, in the cold excessively dilute sewage remain entrained in the settling particles of suspended solids, and are carried to the bottom. As free fatty acids they are soluble in organic solvents and may be extracted from the dried sludge. Any mineral acid will effect these changes, but from an economical standpoint the only acids to be considered are sulphuric and sulphurous. Sulphurous acid is most conveniently made by burning brimstone to sulphur dioxide and dissolving this in water.

It is claimed that the acidified sludge produced by the Miles process is particularly stable and may be kept for several days in hot weather without becoming septic. An even greater advantage is its low moisture content, representative tests showing the average moisture to be about 86 per cent., while that of sludge from plain sedimentation is about 90 per cent. Summarising all the work carried out in connexion with the acid treatment of sludge the concensus of opinion is that the recovery of grease is a profitable undertaking when the sewage contains unusually large amounts of grease, but that with municipal sewages no profits could be hoped for under ordinary conditions. According to American opinion the general attractiveness of the acid process, its lack of scum and odour, and the efficient disinfection and clarification effected, compel attention; and, although it appears that its field is limited, the process possesses possibilities that should not be ignored. Further large-scale investigations of some of the mechanical processes involved would be of value in furthering the science of sewage treatment and waste recovery. The apparently favourable conclusions as to the economic success of the process in America are somewhat surprising in view of some of the

unfavourable conclusions arrived at from European experience; but it has to be borne in mind that the U.S. results relate to operation on a small scale, so that many difficulties in the recovery of grease and tankage may have been overlooked.

Progress in Fuel Research

ELEVEN papers were taken as read and discussed collectively at the meeting of the South Wales Institute of Engineers held at Cardiff on Thursday last. In his opening statement on behalf of the Fuel Research Board, Dr. Lander admirably summarised the present position and the prospects of establishing an industry on sound commercial lines, which might involve the carbonisation of millions of tons of raw coal, and gave it as his opinion that the answer is a conditional "Yes," the elements of uncertainty being economic and social rather than technical. The issue by the Board of a comprehensive report, now in the Press, was announced, dealing with the experimental and technical developments in this field, together with the full results obtained at H.M. Fuel Research Station, and suitable reference was made to the valuable research work of Messrs. Sutcliffe and Evans in the production of a more robust type of briquette as a preliminary to carbonisation.

Attention at the moment is perhaps focussed upon the various types of retort which have been tried upon a works scale, and which Dr. Lander subdivides roughly into externally heated retorts in which the material either remains in repose or is mechanically stirred, and those in which the broken coal is exposed to the sensible heat of large volumes of producer gas passed through the retort. The essential characteristics of such retorts and the theories underlying their design were discussed at the meeting, and it was refreshing to notice how differently the problem has been attacked in each case. The Freeman, Nielsen, Illingworth, Everard Davies, and Maclaurin Retorts have already been fully described in the technical Press, and it is abundantly clear that as hardly any two retorting propositions are alike, there is room for many different types of retort, each of which will ultimately find its own particular sphere of usefulness.

We publish on another page details of a new type of externally heated retort as given at the meeting by Captain C. J. Goodwin, who has given much attention to the subject. This retort is of peculiar interest on account of its simplicity, the almost obvious nature of the device by which scale and caking is prevented, and also because it seems adapted and has, we understand, already been used for certain processes in the heavy chemical industry in addition to the treatment of shales, torbanites, &c. The subjects treated at Cardiff were mainly, of course, of interest to the gas industry, but frequently progress in cognate fields of enterprise brings fresh ideas and new vigour to the all-embracing sphere of industrial chemistry. As regards low temperature coal and shale propositions, time alone can demonstrate commercial success or failure, but it is too often forgotten that high efficiency and ideal thermal and operating conditions are useless unless it is possible to make money from the winning and treatment of the raw materials.

Points from Our News Pages

The fourth article in the series on "Leaders of Chemical Industry" deals with Dr. Charles Carpenter, president of the South Metropolitan Gas Co. (p. 510).

A technical correspondent discusses the wide possibilities of the organic chemical industry (p. 512).

A paper on "The 'Fusion' Patent Low Temperature Retort," presented by Captain C. J. Goodwin at the South Wales Institute of Engineers, Cardiff, is reproduced (p. 515).

Particulars are given of exhibits of chemical interest at the Building Exhibition, which is being held at Olympia, London (p. 517).

According to the Board of Trade Returns for March there was a very considerable increase in exports of tar oil and creosote. The quantity of dyestuffs exported was 306 cwt. in excess of the total for the previous month (p. 518).

The possible economic development of home supplies of fuel oil was discussed by Professor J. S. S. Brame at a meeting of the Manchester Section of the Society of Chemical Industry (p. 519).

Our London Market report describes business as quiet this week in consequence of the Easter Holidays, but in coal tar intermediates the outlook is more favourable (p. 527).

According to our Scottish Market report the amount of business during the week left much to be desired (p. 529).

Books Received

SCIENCE IN THE SERVICE OF MAN: ELECTRICITY. By S. G. Starling. London: Longmans, Green, & Co. Pp. 245. 10s. 6d. net.

A DICTIONARY OF APPLIED CHEMISTRY: Volume III. By Sir E. Thorpe. London: Longmans, Green, & Co. Pp. 735. 60s. net.

The Calendar

April 24	Chemical Industry Club. Monthly meeting. "Cotton from Plant to Fabric." W. Perry. 8 p.m.	2, Whitehall Court, London.
26	Institute of Chemistry. Lecture by Professor A. Barr. 8 p.m.	Hall of the Institution of Civil Engineers, London.
26	Society of Glass Technology. Fifth annual meeting. Presidential address. Annual Dinner at the Royal Victoria Station Hotel at 7 p.m.	The University, Sheffield.
27	South-Western Polytechnic: Lecture on Petroleum. F. Esling. 2 p.m.	South-Western Polytechnic, Chelsea, London.
27	University of Sheffield: "The Constitution of Coal." Dr. Marie Stopes. 5.30 p.m.	The University, Sheffield.
27	Oil and Colour Chemists' Association: "Studies of Precipitation." F. E. Jennison.	The Food Reform Club, Holborn, London.
28	Physical Society of London: Ordinary Meeting. 5 p.m.	Imperial College of Science, London.
28	Royal Institution: "Vitamin Problems." A. Harden. 9 p.m.	21, Albemarle Street, Piccadilly, London.
May 1	London Section of Society of Chemical Industry: Annual Meeting.	Burlington House, Piccadilly, London.
1	Photographic Fair opens.	Royal Horticultural Hall, London.
2	Institution of Chemical Engineers: Inaugural Meeting 8.30, and Dinner, 7 p.m.	Hotel Cecil, London.
2	London County Council Lectures: "Crystal Structure." Professor Sir W. Bragg. 6 p.m.	University College, London.
3	Society of Public Analysts: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London.

Leaders of Chemical Industry

IV.—Dr. Charles Carpenter

DR. CHARLES CARPENTER, the President of the South Metropolitan Gas Co., may be truly described as one of the driving forces in British industrial science. The record of his services to the gas industry alone is such as to proclaim him a leader among his scientific and industrial associates. Various distinctions have been bestowed on him by the gas industry, and his services to science and technology were recognised in 1912 by the conferment on him of the degree of Doctor of Science *honoris causa* by the University of Leeds. In presenting him to the Senate, Professor Cobb, the Livesey Professor of Coal, Gas, and Fuel Industries, used words which are truly descriptive :

Of Mr. Charles Carpenter's distinctions, none can be more honourable, more acceptable to him, and none so appropriate to him in this place, as to entitle him the successor of Sir George Livesey, the man whose eminence of service and nobility of character have, to our honour, been commemorated in the University of Leeds by the establishing of a professorial chair. Mr. Carpenter's consciousness of the inheritance of a proud tradition and his own resourcefulness, initiative, and gifts for organisation and for the furthering of industrial research, have united to make his standard of achievement high, and his work conspicuous in its thoroughness and well-deserved success.

DR. CHARLES CARPENTER

It is not, however, only the distinguished services of Dr. Carpenter to the gas industry which constitute a claim to recognition, but also his contribution to the advancement of the chemical industry. Elected in 1912 to the Council of the Society of Chemical Industry, he was chosen President three years later, and presided over the annual meetings in Edinburgh in 1916 and in Birmingham in 1917. Perhaps, however, the finest memorial of his initiative and enterprise in connexion with the chemical industry is the Association of British Chemical Manufacturers. It was during the period of his Presidency of the Society of Chemical Industry that the idea of a central organisation for the chemical industry was first conceived, and it was the Presidents of the three societies—the Society of Chemical Industry, the Chemical Society, and the Society of Dyers and Colourists—(Dr. Carpenter, Dr. Alexander Scott, and Dr. Rée respectively)—who initiated the movement which resulted in the establishment of the Association of British Chemical Manufacturers. The honour of serving as Chairman of the Council of the Association during the first two years of its existence was accorded to Dr. Carpenter, and the high position held by the Association of British Chemical Manufacturers at the present time may be largely attributed to the sound foundations laid in those early days.

Apart from his public services, Dr. Carpenter is well known as an enthusiastic advocate of intimate co-operation between engineer and chemist, and his recognition of the true place of chemistry in connexion with gas manufacture is one of his signal services to the chemist and the chemical industry. At the works of the South Metropolitan Gas Co. not only has the chemist been recognised as indispensable, but a definite chemical side has been created and developed. The manufacture of by-products is a separate entity, bearing its own charges, and with an organisation quite distinct from the main gas business. Dr. Carpenter has never lost sight of the great potentiality possessed by the gas industry in the form of the raw materials derived from the distillation of coal, and during the war played no small part in increasing the production of such by-products as were required by the country. When supplies of dyestuffs were cut off Lord Moulton urged him to undertake the manufacture of intermediates, and later, when the need for explosives became so acute, plant was erected at the works of the company for the manufacture of synthetic phenol, the output being up to 200 tons per week. The result is that to-day the works of the South Metropolitan Gas Co. include very considerable plant for the production of intermediates for dyes.

Perhaps the most outstanding characteristic of Dr. Carpenter himself is his almost impatient discontent with anything short of the best, combined with a capacity for taking great pains to attain the desired end. In the chemical department of the South Metropolitan Gas Co. may be seen two large glass vessels — the one containing ordinary sulphate of ammonia, damp, discoloured, coarse; the other containing neutral sulphate, so dry, so fine, so purified that it falls through the fingers like the finest sand. The conversion of the one grade of salt into the other was due to Dr. Carpenter's belief that the production of a fine quality neutral sulphate was technologically and commercially possible, and to the persistence of his efforts until this end was achieved. In the production of neutral sulphate he has set a new standard, and his influence generally in all industrial matters has been towards the establishment of new and higher standards of efficiency.

Dr. Carpenter, independent and individualistic thinker as he is, may have his own views on details of policy, but he is profoundly convinced of the importance, both for peace and for war, of a national chemical industry. He regards our loss of the lead in organic chemistry—including, of course, the great lead that Perkin gave in synthetic dyestuffs—with something like humiliation, although this loss is compensated to some extent by the maintenance of our foremost position in heavy chemicals. It is probable that, were Dr. Carpenter asked to give a message as an engineer to the organic chemical industry, he would urge technical chemists engaged in the study of organic chemical processes not to forget that in the laboratory manipulative skill plays a most important part in the attainment of satisfactory results, and for the conversion of these results to the large scale far greater attention must be paid to the interpretation and reproduction of the tricks of manipulation learned in the organic laboratory.

To sum up, it would appear that Dr. Carpenter's guiding principles are :

Investigate to improve your product.

Improve it on the working scale.

Manufacture consistently the improved product day in and day out.

Confidently await satisfactory commercial results.

Reviews

ISOTOPES. By F. W. ASTON, M.A., D.Sc., F.R.S. London : Edward Arnold & Co. Pp. 152. 9s.

Dr. Aston's work on Isotopes and Mass Spectra is well-known. He has continued the investigation begun by Sir J. J. Thomson in 1912, improved and extended its methods, greatly enlarged our ideas of the elements, and made a very handsome contribution to knowledge. In less than ten years, most of which were subject to the disturbing effect of the war, he has carried out a series of delicate experiments so carefully and scientifically that his results are now universally accepted. Minor corrections on some points which he admits are not free from doubt will in due course assuredly be made. But the work he has already done has placed him in the front rank as an investigator in the problems of theoretical chemistry. In this domain Britain has always been prominent ; Priestley, Dalton, Davy, Faraday, Ramsay, Rutherford, Soddy, and Aston form a constellation which no other country can surpass, and it may be doubted whether even France can produce quite so distinguished a galaxy. And there are some other equally distinguished men of science whom Britain has produced in very closely allied branches, and names such as Clerk Maxwell, Rayleigh, Thomson, and others readily occur to one. Dr. Aston's book on Isotopes is worthy of the author and of the subject, and this is saying a good deal. It is well written and well printed ; clear thinking and clear printing do not always go together. The earlier chapters give an account of radio-activity and positive rays, and of the theory of isotopy. The Mass Spectrograph is described in detail, and the mathematical principles involved in this piece of apparatus are fully set forth. The actual results obtained by Dr. Aston are given, and also the very recent ones which Dempster has extracted by his latest apparatus in the Physical Laboratory at Chicago. The following elements have now been investigated : hydrogen, helium, lithium, beryllium, boron, carbon, nitrogen, oxygen, fluorine, neon, sodium, magnesium, silicon, phosphorus, sulphur, chlorine, argon, potassium, calcium, nickel, zinc, arsenic, bromine, krypton, rubidium, iodine, xenon, cœsium, mercury. It is to be hoped that this list will be greatly extended.

Atomic Weights, it is now realised, are in many cases a mere average of two or more numbers, and it is these numbers, rather than their averages, which throw light on the relationship of the elements. The old international committee on Atomic Weights has now been replaced by an international committee on the elements, and Great Britain is represented on this committee by Dr. Aston and Professor Soddy. Two or three years ago this would have been considered an honour for Dr. Aston ; the position now is that such a committee can hardly get on without him, and it is to be hoped that he will be able to attend the formal meeting of the committee at the Conference of the Union Internationale at Lyons next June.

But to return to the book ; there are two plates of Mass Spectra, reproduced by permission of *The Philosophical Magazine*, where they were first published ; there is an account of the relationship between the masses of isotopes and atomic numbers, a short account of the atom as conceived by Lewis & Langmuir, and brief notices of the electrical theory of matter, the spectra of isotopes and the separation of isotopes by diffusion, fractional distillation, and photo-chemical methods. None of these methods seems likely to work on a large scale, but many of them are of considerable theoretical interest. M.

The Institution of Chemical Engineers

Meetings of the Provisional Committee

THE Provisional Committee of the Proposed Institution of Chemical Engineers held meetings on March 22 and April 5 at 166, Piccadilly, London. Mr. W. J. U. Woolcock, M.P., occupied the chair at the first meeting, and Sir Arthur Duckham, K.C.B., presided at the second.

An interesting feature of the first meeting was a letter from the President of the American Institute of Chemical Engineers, who made the following propositions :—(*a*) The American Institute would print, in its Year Book, the names and addresses of all the members of the English Institution, and the English Institution on its side would print, in its Year Book, the names and addresses of the members of the American Institute. This would be of use to English and American members when visiting the United States and England respectively. (*b*) All members in good standing in the English Institution should have all the privileges of regular members of the American Institute, except voting, at the meetings of the American Institute. This would include participation in sessions at which papers are read, and visiting such industries as may be on the programme. The same privileges would, of course, be extended by the English Institution to members of the American Institute visiting England. (*c*) One copy of all bulletins and publications to be sent by the Secretary of each Institute to the Secretary of the other, who, in turn, can transmit such information as he thinks will be of interest to the members of his own organisation. By this means members of each Institute will be kept posted as to the activities contemplated by the other and perhaps arrange their plans so that they can participate if they are called upon to visit England or the United States as the case may be. (*d*) The copies of the transactions of each Institute are to be available to all members of the other Institution at cost price.

After considerable discussion on the first steps to be taken in the formation of the Institution it was agreed that the statutory minimum of seven signatories be adopted in the first instance. Nominations were made of gentlemen both of the Provisional Committee and the Advisory Committee, and a ballot was taken, and the following gentlemen were elected as signatories to the documents :—Sir Arthur Duckham, Mr. C. S. Garland, Professor J. W. Hinchley, Mr. W. Macnab, Mr. J. Arthur Reavell, Mr. F. H. Rogers, Mr. H. Talbot.

At the April meeting it was further agreed that the seven signatories should be the first Associate Members of the Institution. A small committee was elected to meet a similar committee of the Institute of Chemistry to discuss informally the new Institution. Other steps were taken to ensure the utmost amiability with all similar scientific and technical bodies. It was also agreed that until the first general meeting, when a properly constituted Council could be elected, the Provisional Committee should act as the first Council of the Institution, the seven signatories being the legal representatives.

Most of the numerous letters received from members of the Advisory Committee contained congratulations to the Provisional Committee and the solicitors on the work done, and there were several hundreds of suggestions for improvement in the Memorandum and Articles of Association and By-laws of the Institution. Many of the suggestions were adopted by the Provisional Committee. It was agreed that the initial " I " for " Institution " be inserted in the abbreviated titles, and that no abbreviated title be adopted for the graduate class. Finally the solicitors were requested to take the necessary legal steps for the registration of the Institution. A selection committee was elected to draft Application Forms for Membership, and to nominate to the first Council the first members and associate members of the Institution.

It was then decided that the Inaugural Meeting of the Institution be held on Tuesday, May 2 next, and that it should be preceded by an Inaugural Dinner, and should, if possible, be held at the Hotel Cecil, Strand, London.

Zinc-Dust Fires

AT the request of the Grasselli Chemical Co. small scales tests have been made at the Pittsburgh, Pa., Experiment Station of the U.S.A. Bureau of Mines to determine the best hand extinguisher for use in zinc-dust fires. Water, sodium bicarbonate solution, carbon tetrachloride, silicon tetrachloride, hydrogen chloride and firefoam were used to extinguish the fire started for the tests.

Possibilities of the Organic Chemistry Industry

For the past two years few subjects of scientific importance have occupied public attention more than that of dyes. Although the economic and political aspects have naturally attracted the greatest attention, the subject is essentially one on which the scientist has the first claim to be heard.

It is too often assumed that the manufacture of dyestuffs on a sufficient scale and of good quality is all that is necessary. That is not so. Indeed, it is almost the reverse of the truth. So far as dyes are concerned, even before the war the effects of over-production and competition were strongly marked, and the great German firms were concentrating their efforts more and more on the discovery of new fields of activity in which the knowledge and experience gained in dye manufacture could be put to the greatest advantage.

The brilliant success they attained is well known. Nitric acid was made from atmospheric nitrogen, the contact process for oleum perfected, and new synthetic products continually being brought on to the market. It is the object of the present article to examine the possibilities of the future from the standpoint of the chemist.

The subject may be conveniently divided into two portions: (1) The development of the dye manufacture itself, (2) the possible extensions of the activities of the dyeworks into other fields of manufacture.

It has been wisely said that the dye industry has been merged into the vast new industry of synthetic organic chemistry. That statement is true, and it is vitally important that the full significance of it should be vividly before the minds of all concerned in its establishment in this country. It means that, so far from taking over a well-established business, we are really only starting almost at the beginning of a new one, of which the production of synthetic dyes is merely a first achievement—one of great importance in itself, but of still greater in its promise of future achievements.

The Dyestuff Industry

Before the war the capital invested in the dye industry was some £10,000,000, and the value of the dyes produced about £20,000,000. At the present time the capital invested is at least £40,000,000. The pre-war profits of the great companies averaged about 16 per cent., and there were, as already stated, distinct signs of over-production even then. Evidently the problem of making the industry a paying concern is now by no means easy of solution.

So far as the manufacture of dyes is concerned it is clear that every effort must be made to eliminate unnecessary dyes and to produce new ones which shall prove of wider range of utility than the present, and that the discovery of new applications for dyes is of as great if not of more importance than merely cheapening the cost of production. The dye industry cannot stand still. There is no standard dye. Synthetic indigo, for example, has only just established itself; yet already its position is being assailed by newer dyes. Some of the newer polyazo violets prove to be superior to it as wool dyes, whilst some of the red dyes derived from J acid (2.5.7. amino naphthol sulphonic acid)—for example rosanthrene—bid fair to supersede Alizarines; and they in turn are already feeling the competition of Naphthol A.S. and other derivatives of 2.3. oxynaphthoic acid.

But the work involved in the commercial synthesis of indigo would not be wasted even if indigo were entirely ousted from the market; for a whole series of new intermediates has been placed at the disposal of the chemist, and new combinations undreamed of ten years ago are being prepared, some of which are particularly interesting as producing vat dyes, a division in which there is still immense scope for research.

Closely related to the problem of utilising intermediates is that of finding uses for other constituents of coal tar. Phenanthrene and carbazol have already been brought into service, and others will undoubtedly yield to the chemist's examination in the future. Of the 200 substances already isolated from coal tar barely a score are utilised by the dyeworks, and they form less than 5 per cent. There is, then, within the confines of dye chemistry alone still much to be done, and a necessity for continuous search for newer and better products. There can be no question of merely groping among German patents or extracting "secrets" from them, as so many people imagine—many of them people whose education and training should have taught them better. The whole history of the industry proves that not in the immediate discovery is the great asset, but in the experience that has been gained in the endeavour to attain it. Nor is the truth illustrated only by the quest for new products. Attempts to improve the quality and purity of existing materials have been equally productive of good. The purification of anthracene blue resulted in the isolation of alizarine-sphirol, the mother substance of a whole series of important acid anthracene dyestuffs. Our dye makers will suffer severely if they content themselves merely with supplying the ordinary grade dyestuffs for the textile trade. The crucial test of the excellence of their products must inevitably be the pigment industry. In this the dye and all its impurities are precipitated together, and even traces of extraneous matter cause disastrous results. Quite apart from the immediate advantage of capturing that market, the effort of producing the necessary consistency of quality and high standard will prove of inestimable advantage in many ways.

The success of the industry must to a large extent depend upon its ability to capture the foreign market. The Far East is the obvious solution, and there, since colour has so often a ceremonial and religious significance, and climatic conditions test fastness so severely, consistency of quality and permanence of colour are of the greatest importance. It has been estimated that China and Russia alone could take nearly 50 per cent. of the world's output of dyes.

There is, too, an undoubted tendency in this country to buy the better-class dyes even if they cost rather more. While, therefore, it is true that to be successful economically, the dye industry must develop into the synthetic organic chemical industry, it is evident that this particular field cannot be neglected or merely carried on in a routine fashion while the research staffs are engaged in exploring other fields. Both problems must be tackled simultaneously. Nature does not recognise our arbitrary divisions. Her work is a beautiful and harmonious complex. The fact discovered in one of our scientific compartments may, and often does, prove to have even greater significance when considered in connexion with another and apparently distantly related branch of knowledge. Indeed, the development of the second portion of this subject affords many striking illustrations of the truth of that statement.

The Synthetic Chemical Industry

The dye industry is a "key" industry from the scientific as well as from the economical point of view. To satisfy its demands new processes of vital importance have been introduced into the heavy chemical industry. One of them, the fixation of atmospheric nitrogen, may be truly described as an achievement of vital importance to the whole of the human race. The development of catalytic processes for the manufacture of sulphuric acid is of only less significance. On the other hand, the necessity for fresh outlets for the energy of the dyeworks caused by their phenomenal successes in fulfilling their original destiny can only find satisfaction in developing other branches of organic synthesis for which their construction and the experience of their staffs render

them eminently suitable. Three possible lines of work are at once apparent—pharmaceutical compounds, fine chemicals, and photographic chemicals.

None of these, nor indeed all three together, can prove of sufficient magnitude to absorb the whole energy of the industry which, being specifically an application of science, must continually develop in order to exist. But they do form an important adjunct to the dye industry, and, as in the case of dyes themselves, the experience gained in supplying the demand will prove invaluable in attacking fresh problems.

Pharmaceutical Preparations

The history of synthetic drugs began in 1881, when a derivative of quinoline, kairene, was placed on the market as an antipyretic. It was, however, not very successful, and two years later Knorr introduced Antifebrin, which proved a tremendous success, and was followed by many similar preparations. It is to be noted, however, that they did not possess the specific curative properties of quinine ; they only combated the symptoms, and continual efforts were made to find more effective preparations. Pyroamidon, one of the more recent, has the advantage of not affecting the heart. Another series of synthetic drugs began in 1887, when the antipyretic properties of Acetanilide were discovered.

The discovery drew attention to the modification of physiological properties produced by the introduction of various radicles into the molecule, for aniline is also a febrifuge, but cannot be used on account of its destructive action on the red blood corpuscle. A similar case is that of the acetyl derivative of salicylic acid, sold as aspirin, which possesses all the beneficent qualities of salicylic acid without the disadvantage of disturbing the digestive system. The year 1887 was also marked by the appearance of the important drug Phenacetin, the ethyl derivative of para amido phenol.

Equally interesting as affecting the problem of the connexion between chemical constitution and physiological properties is the effect of substitution on the bactericidal value. Thus Penta-brome-phenol has 500 times the germicidal value of phenol. Many other cases could be cited, but it is evident that chemical research in conjunction with physiological research cannot fail to produce results of the highest importance.

The interest in this subject has, however, been lessened by the more sensational results obtained in two other directions. The synthesis of complicated natural drugs and the medical value of certain dyestuffs. In the first the synthesis of Adrenaline by Meister Lucius and Bruning is perhaps the greatest achievement. The drug was only isolated in 1901, and to provide one pound of it the glands of some 20,000 sheep or oxen were required. Its synthetic preparation from Guaiacol, a constituent of beechwood, is, therefore, of great importance.

In the other direction the researches of Ehrlich have attracted the greatest attention, and work in this field has resulted in the medical application of several dyestuffs and their derivatives. Methylene blue and Auramine yellow have proved efficacious in the prevention of gangrene, and are stated to have proved of value in the treatment of diseases so diverse as cancer and malaria. Particularly interesting are the properties of the derivatives of dyes of the Congo Red type. " Trypan " blue, which destroys the trypanosomes of cattle disease and " trypan red," which destroys those of the horse disease prevalent in South America.

From this condensed account it is evident that the study of dye products and their derivatives is of immense range, and pregnant with great possibilities for the future welfare of the race. Again it must be pointed out that there is no finality in the investigation; new discoveries arise from researches in the most divergent branches of the study of organic chemistry, and the more thorough examination of materials that are generally accepted as completely known has proved as fruitful of results as the most original research into the unknown.

Synthetic Perfumes

Although the work in connexion with synthetic drugs is of great importance, it could not provide sufficient outlet for the energy of the industry. Though of great value, the amounts are comparatively small : the imports of Phenacetin in 1909, for example, were only 8 tons, and this is a comparatively popular drug.

The field of synthetic perfumery is considerably larger, and the action of the synthetic chemist has been along three lines :

(1) The preparation of compounds with odours resembling natural perfumes such as salicylic aldehyde, imitation meadow-sweet, and anisic aldehyde resembling hawthorn.
(2) The synthesis of naturally occurring perfumes.
(3) The conversion of a natural product into another and more valuable product.

The synthesis of cumarin from phenol by way of the aldehyde of salicylic acid is an example of the second, and the conversion of eugenol to vanillin a typical example of the third line of procedure.

The perfumery trade is a very lucrative one, and one in which there is a continually growing demand for better quality materials and cheaper rates.

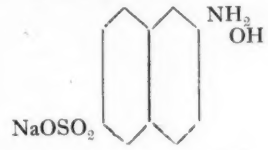
In some cases the present supplies are limited and not particularly reliable, and hence the chemist has every inducement to work hard in this branch of synthetic chemistry.

Photographic Chemicals

The continued rapid increase in photographic work makes this a particularly promising field for the expansive power of the industry under consideration, and during the last half century there have been many important improvements in the chemical equipment of the photographer.

The first venture in the field of developers was hydroquinone, which possessed the advantage over " pyro " of not staining the fingers (Abney, 1880). It gave, however, somewhat harsh effects, and was soon followed by a series of compounds such as the derivatives of the amido-phenols, for example, " Ortol," ortho amido phenol and " Scalol," the methyl derivative of para amido phenol.

A new series was inaugurated by Meldola's discovery of " Konogen," a naphthalene derivative,



Another valuable development in photography due to the dye industry is the panchromatic plate. The development of this was a matter of extreme importance during the war, and the English chemist can justly claim to have improved on the pre-war article, which was practically German monopoly.

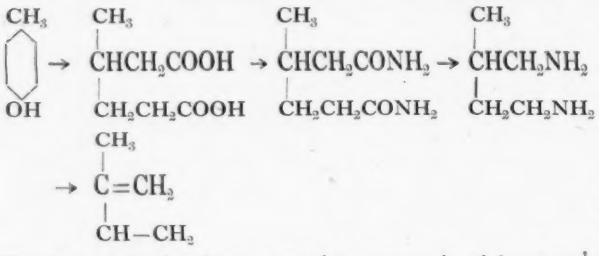
Need for Further Extensions

The industries so far referred to are those in which the types of product dealt with by the dyeworks find a fairly obvious use. The problems connected with them are largely matters of the production of new synthetic organic compounds or of finding uses for those already existing. Taking them all together, they represent a great addition to the sphere of activity of the dyeworks, and, indeed, the dyeworks have so far entered that sphere that the synthetic chemical industry can be described as a commercially successful achievement. Synthetic rubbers, tanning materials and resins in this respect surpass all the preceding developments in industrial magnitude and economic importance.

Rubber.—The history of this research dates back to 1860, when Williams obtained isoprene by the destructive distillation of Caoutchouc, which polymerises readily to a white spongy substance practically identical with the natural

caoutchouc. Many researches have been made since then, and the synthesis of rubber has largely been a problem of finding a method of synthesising isoprene or its isomers at a cost comparable with natural indiarubber.

Many methods are available. One method used by the Bayer concern starts with a coal tar product, para cresol,



But its preparation from two other sources is of far greater interest on account of the great abundance of the raw materials, starch and acetylene. The preparation from starch depends on the preparation of lævulinic acid and its conversion to methylthiophene which yields isoprene on reduction by Sabatier's method. The results so far have not been very promising owing to the possibility of the reaction proceeding in another direction with the formation of piperyline. A much more satisfactory yield is obtained starting with alcohol and converting it to trimethylene dibromide by the usual methods which yields isoprene (according to Harries) on passing over soda lime saturated with carbon dioxide at 600° C. A yield of 60-75 per cent. is claimed.

The preparation from acetylene has so far not been successful to a degree sufficient to bring it within the range of commercial possibilities, but recent studies on the condensations of acetylene have shown that there are many possibilities worthy of attention.

It may seem that this account hardly justifies optimism. But the difficulties already overcome certainly do justify one in believing that the remaining ones, though undoubtedly they may be even greater, will be surmounted, and the prize is so great that every effort to win it is worth making. Even if a product is obtained inferior to the best qualities of the natural rubber there are numerous applications in industry where the best quality is not a necessity, and, provided the physical properties are those demanded, the question of chemical identity is to a large extent immaterial.

Tanning Materials.—In this sphere more concrete results have already been obtained; a preparation known as "Neridol D" was largely used by the Germans during the war. It was a condensation product of phenol sulphonic acids with formaldehyde. Many other similar compounds also possess tanning properties; for instance, the condensation product of naphthylamine and amido naphthol sulphonic acid.

Another series of great interest is the polydepsides. Fischer and Quicke have shown that the di-depsides *e.g.*, $OHC_6H_3SO_2OC_6H_4SO_3H$, precipitated gelatine, but did not tan hides, while the tri-depsides did both. Incidentally this tri-depside proved to be a crystalline compound, and thus destroyed the theory that tannins were necessarily amorphous. Evidently we have here a tremendous field for the synthetic chemist. The work begun by Fischer is being continued by Freudenburg, and several papers have been published which show continued advance towards the solution of this fascinating problem. It is to be hoped that English chemists will not be left behind in the race.

Resins.—In this case the work is of great importance, and, indeed, almost an urgent necessity. The supply of resins from natural sources is defective in many ways. In the case of the fossil resins we appear to be dangerously near the end of the world-supply, and in the case of the others it is in many cases extremely variable in quality, and the trees which secrete them grow in tropical lands where it is difficult to supervise their cultivation and the collection of the resins with the care possible in the case, for instance, of the turpentine-yielding trees of America and France.

There is consequently every inducement to prosecute the search for synthetic products capable of taking their place with energy.

Leaving out the formation of "estergums" from calophony by treatment with glycerine two very interesting series of compounds have been prepared: (1) Condensations of phenol and formaldehyde, and (2) coumarone derivatives.

The first, described as the Bakelite type, has been the subject of an ever-increasing number of patents during the last few years, and compounds of this type are being used to a considerable extent.

The fact that the varnish maker is probably one of the most conservative craftsmen in modern industry makes commercial progress difficult and slow, but numerous companies are now in operation which are fully alive to the possibilities of synthetic chemistry, and progress is being made at an accelerating rate.

The coumarone series has received a great deal of attention in the United States and in Germany. In fact, paracoumarone resins are described by some American writers as being common articles of commerce. Coumarone is a constituent of solvent naphtha. So far the products do not aspire to replace the higher grade resins, such as those used by the coach builder, but the amounts of these used are comparatively small, and the science and art of varnishing is being so rapidly revolutionised that the entire replacement of resin-varnishes by various chemical compositions is not by any means an impossibility, and the compounds referred to above will undoubtedly figure largely in this revolution.

Conclusion

The above does not profess to be more than a rapid survey of the future possibilities of synthetic chemistry, and it by no means exhausts them. It confines itself to those in which the intimate acquaintance with organic chemical synthesis on a commercial scale, which is the peculiar asset, and, indeed, the vitally important asset of the dyeworks, is likely to make them the centres of activity in the attack on these new fields of exploration. Enough has been said to show that in research, continued and systematic, is to be found the only guarantee of permanent success in the industry which is at present being founded, or rather revived, in England. No achievement, however great, can be final, nor can it justify resting on the laurels gained.

A great German chemist is reported to have said that no matter how carefully it was nurtured in this country, Englishmen could never be successful in the sphere of organic synthetic chemistry on an industrial scale because they had not that power of consistent mental application which is the first essential in a field where disappointments are far more frequent than successes, and where faith in the value of purely scientific research was the fundamental necessity in those responsible for the direction of the industry. It remains for the British commercial man to give the British chemist a chance to prove the falsity of the German estimate.

Standardisation of Non-Metallic Mineral Products

ACCORDING to Mr. Oliver Bowles, mineral technologist of the U.S.A. Bureau of Mines, the broad field of mineral fillers is sadly lacking standardisation. Many users of mineral materials have very indefinite knowledge of their requirements either in colour, grain size, grain shape or chemical composition. The standardisation of fillers is practically an untouched field, and such standardisation accomplished through a comprehensive study of the subject would not only promote better manufacturing processes but would be of material benefit to producers. It is claimed by one producer that the cost of purchasing special screens to satisfy the requirements for odd sizes of his finished product for one customer destroys most of the profit obtained from grinding roofing grade talc.

The "Fusion" Patent Low Temperature Retort *

By C. J. Goodwin, A.C.G.I., B.Sc., A.M.Inst.C.E.

THIS paper has been prepared at the request of this Institute, and it devolves upon me, in the following notes, to give a brief description of the "Fusion" Retort, and of the general principles underlying its design and operation.

Those connected with the development of plant for the recovery of oils from coal, shale, torbanite, or the like, are practically all agreed that reduction in size to, say, a ¼ in. mesh is the first essential step in the process :

1. Because the yield of oil is increased.
2. Because a lower retort temperature can be used, and there is, therefore, less risk of cracking and carbon deposit.
3. Because if "smalls" have to be rejected from the material as mined or quarried, the delivered costs to the retort are increased according to the percentage of rejected material.

The other essential conditions for efficient and economical operation may be summarised as follows :

(*a*) The thickness of the layer of material in contact with the heated surface should be a few inches only so that the oil vapours can be freely evolved. This, again, assists in keeping down the temperature.

(*b*) The material during heat treatment should be continually turned over, and in such a way that at one moment it is in contact with the heated surface and at the next removed to the gas-evolving zone or layer. This prevents overheating and promotes free and regular evolution of gas.

(*c*) The temperature of the material should be gradually increased to its maximum over a period of not less than about twenty minutes.

(*d*) The retort should be so constructed that the heated surfaces can be kept perfectly free of scale or deposit, and, further, that caking of the material upon itself is prevented. If it is possible during treatment, and particularly in the early stages of the treatment, to further break up the material so that fresh surfaces are offered to the heated surfaces, so much the better.

(*e*) The most controversial point seems to be the desirability of removing moisture from the material previous to the treatment for extraction of the oil. Tests have shown that moisture cannot be completely removed, and in dealing with a certain oil shale it was found that whilst the evolution of moisture began at about 150°C. and continued until the temperature was over 300°C., evolution of oil commenced at about 250°C. It would appear, therefore, that complete removal of moisture before evolution of oil is not feasible, however correct the principle involved. On the other hand, quite a number of experienced people claim, and with some grounds for their claim, that the presence of a small percentage of steam in the retort is beneficial not only as regards yields but also as regards quality, &c., of the oil. The free moisture cannot be removed after the material is charged into the retort unless the retort has sealed compartments, and in their absence and under normal circumstances a part of the oil would go over with the moisture or part of the moisture would go over with the oil. In actual practice, therefore, only part of the free or mechanically combined water can be removed.

A study of current publications and patent literature shows that many attempts have been made to fulfil some or all of the above conditions. Rotary tubes with stationary scrapers, rotary tubes with rotary scrapers, stationary tubes with rotary scrapers, and many modifications and differences in detail have been employed and suggested. But it is obvious that in all such arrangements there must be a reasonable clearance between tube and scrapers, and this permits of the birth of scale. Ultimately the nose or end of the scrapers comes into contact with the scale, and the result is only too often an ideal brake, heavy power consumption and probably after a few weeks of continuous running a bent or broken scraper shaft or blades. Apart from such breakdowns and the formation of scale, with resulting loss of heat, the scrapers so far devised fail to break up the material if it cakes or "balls," they do not fully break up the material itself and offer new surfaces for heat treatment, and, lastly, the tube itself is never free of scale or deposit.

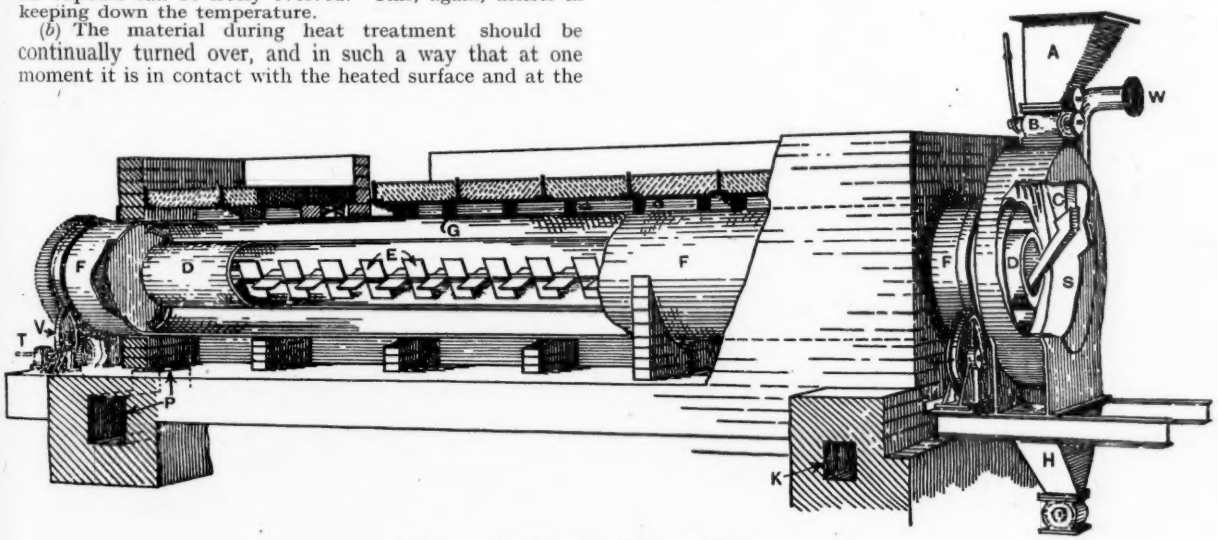


FIG. 1.—THE "FUSION" PATENT RETORT.

Description of "Fusion" Retort

In the "Fusion" Retort (Fig. 1) there is no scraper action of the kind referred to, but the device shown gives a "chipping" action. The retort in rotating tends to carry the loose "star" or "cross" breaker with it until a point is reached (which will, naturally, vary slightly) when the breaker falls back and one point or edge of the star or cross comes in contact with the bed of material being treated, giving a chipping or hammer effect in the nature of a glancing blow. The power required for operating this breaker is extremely small and can be closely ascertained by the fluctuations of the Ammeter between the time when the breaker has just fallen over to the time just before it falls over again. Numerous readings indicate that for operating the breaker about 0.1 h.p. is required in a retort capable of treating an average of 4.25 tons per twenty-four hours. Contrary to expectation, the retort is not noisy in operation, particularly when a six point instead of a four point star is used. Similar types of breaker are used

* A paper presented on Thursday, April 20, 1922, at the South Wales Institute of Engineers, Cardiff.

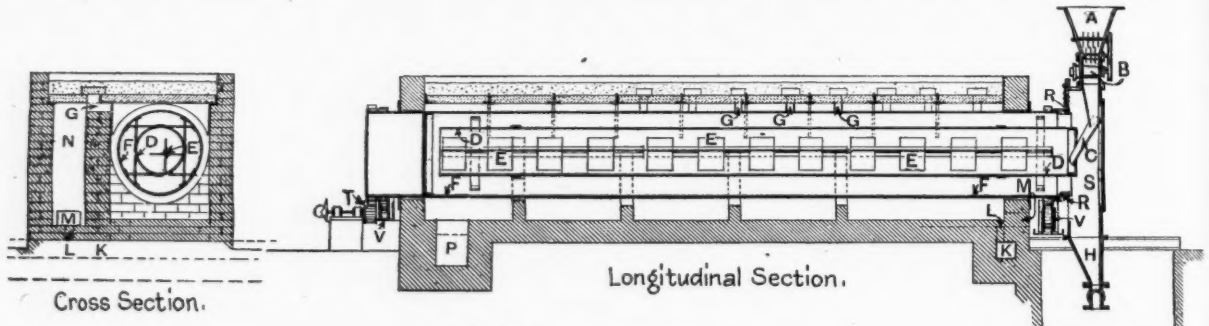


FIG. 2.

A. Raw Material Hopper.
B. Air-tight Feed Valve.
C. Raw Material Guide Pipe.
D. Rotating Inner Tube.
E. Breaker or Pulveriser.
F. Rotating Outer Tube.
G. Ports with Dampers for conveying the products of combustion to the furnace round the Rotating Tube F.
H. Spent Material Hopper with air-tight Valve for discharge.
K. Gas Feed Conduit.
L. Gas Inlet to Combustion Chamber.
M. Air Inlet to Combustion Chamber.
N. Combustion Chamber.
P. Flue to Chimney.
R. Gland for making joint between Feed Chamber and outer tube F.
S. Feed Chamber.
T. Gear for Rotating Tube.
V. Rollers upon which the tube rotates.
W. Oil Vapour and gas outlet.

in the annular space between the retorts when necessary or alternatively the inner tube is provided with external ribs and itself acts as a loose breaker.

It will be noticed that the arrangement shown necessitates a rotary tube or tubes. The outer tube is about 2 ft. 6 in., and the inner tube about 18 in. diameter. (Fig. 2.) By using two tubes only one gland is necessary, and there is the additional advantage that the oil shale during its initial or very delicate stage is only subject to indirect heating. Numerous experiments have shown that this is important.

Rotary retorts for the treatment of bituminous materials, for calcining materials and for other purposes, have usually suffered from or failed through the use of an ordinary gland, which is expensive, and very difficult to keep tight without undue friction. While the diameter of the tube at the end could be reduced so that a gland of less than 2 ft. 6 in. could be used, the serious

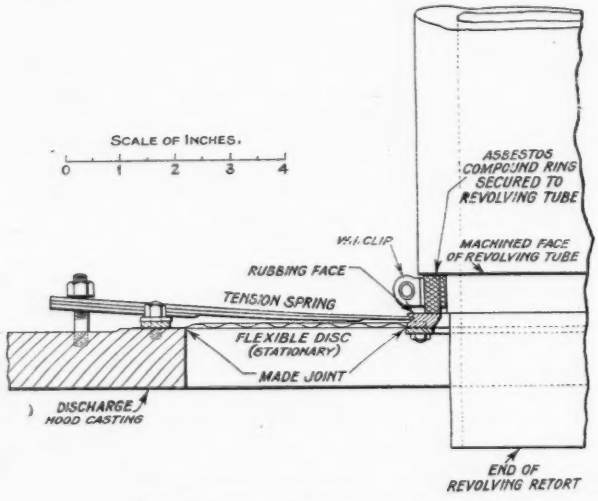


FIG. 3.—DETAIL OF FLEXIBLE JOINT.

difficulties and disadvantages of a gland nearly caused this type of retort to be abandoned in spite of the advantages already described. The final solution was relatively simple, consisting of a diaphragm of thin sheet metal carrying circular corrugations for the purpose of giving extra flexibility, and carrying at the outer end a steel ring, springs keeping the latter in close contact with an asbestos compound ring placed upon the end tube. (Fig. 3.)

Yields and Costs

The subjoined table gives the results obtained in a few typical trials carried out with the "Fusion" Retort, and in this short paper it is not proposed to discuss them in detail or to make any comparisons. Attention may, however, be drawn to the relatively low carbon content of the residue, showing that "cracking" was practically absent.

Typical Tests with "Fusion" Retort.

Material treated.	Esthonian shale.	Nova Scotia Torbanite.	Australian Torbanite.	Kimmeridge Shale.
Gallons of oil recovered per ton of *undried* material (exclusive of oil recovered by scrubbing of gas)	73.6	51.8	131.7	52.5
Specific gravity of oil ..	0.921	0.849	0.854	0.980
Percentage of volatile matter in residue	4.96	6.10	13.95	6.85
Percentage Carbon content in residue	10.6	0.50	26.0	20.1

Note.—With Esthonian shale the bulk of the oil came off between 275° and 450°C., and with Kimmeridge shale between 300° and 400°C. Tests on residue of Esthonian shale are sometimes misleading owing to the presence of finely divided limestone. With Esthonian shale about 2,360 cub. ft. of gas of 894 B.Th.U. before "stripping" was evolved.

Fig. 4 illustrates the temperature gradient in the retort during a typical run. The kink at the beginning of the lower curve is probably due to the liberation of free moisture at this

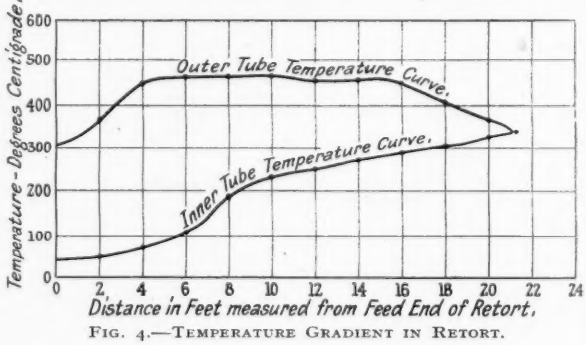

Temperature - Degrees Centigrade.
0 100 200 300 400 500 600
Outer Tube Temperature Curve.
Inner Tube Temperature Curve.
0 2 4 6 8 10 12 14 16 18 20 22 24
Distance in Feet measured from Feed End of Retort.

FIG. 4.—TEMPERATURE GRADIENT IN RETORT.

point. It will be noted that the gradient is fairly uniform until a maximum is reached, when, after remaining almost steady for a few feet, the temperature falls towards the outlet end in the desired manner. No difficulty is experienced in maintaining a steady gradient and the desired temperatures in continuous operation. The temperature of the oil vapour and gases leaving the retort averages about 250°C., while with

the retort setting illustrated the temperature of the flue gases is about 425°C. The gases from the inner tube do not, of course, pass through the annular space between the two tubes, the gases from which are at a higher temperature, and this arrangement and the ultimate mingling of the two streams of gas present obvious advantages. At present the waste heat in the flue gases is not being utilised, but their temperature is sufficiently high to render the installation of a waste heat boiler remunerative in certain cases. Should partial pre-drying of the material be desired—and there may be cases where this shows a profit on the extra cost of installation—the heat in the flue gases may be utilised in a simple form of drier, a separate retort for this purpose being quite unnecessary. To remove part of the moisture from within the retort, though quite feasible, complicates the design and unduly increases the capital cost of the plant for a given output.

Costs of installation and operation naturally vary somewhat with the material treated, but at the present time the following figures may be taken as approximately correct :

Plant comprising ten "Fusion" retorts, with a total capacity of 35 to 50 tons per twenty-four hours according to material treated	£2,000
Main driving shaft, pedestals, &c., driving arrangement for automatic feeds, conveyor and elevator for material to be treated ..	£450
Combustion and heating chambers, including fire and red brick, with thick walls, including buckstays, tie rods, &c.	£590
Contingencies	£360
	£3,400

The cost of buildings, crushing plant, condensers, &c., is more or less the same whatever type of retort is used, and it is not, therefore, proposed to give details. It will be seen that the cost of the retort plant averages about £80 per ton of material treated per twenty-four hours.

One man would suffice for operating ten retorts, but two men per shift are considered preferable, and they would have ample time to attend to the crushing and condensing plant as well. On this basis labour charges would work out at 1s. 3d. per ton of material, while repairs, maintenance and stores would increase the figure to about 1s. 6d. per ton. As regards power, about 10 h.p. would be required for the retorts, and the uncondensable gases evolved, though small in quantity, will suffice for a gas engine large enough to drive the retorts, elevators, &c. Such details are, however, best left over for settlement according to local and other circumstances, the material figures having been set out above.

In the treatment of oil-shale, torbanite, &c., a high recovery efficiency of oil is the main object, but in the case of coal or similar material the objects are twofold—tars and coke or semi-coke. In the retort under review the coke rejected from the plant will be in a finely divided state and therefore unsuitable for industrial purposes without further treatment. If coke or semi-coke dust firing becomes a commercial proposition,* and there are already indications that it is, then we have a material which is almost ready for such use. The residual products from this type of retort could be used with advantage in certain types of producer gas plant, but if it is to be used as domestic fuel or for certain industrial purposes briquetting would be essential, and some authorities claim that this would pay. Their application as a pulverised fuel probably requires further investigation before one could speak with any degree of certainty as to their commercial utility.

Summary and Conclusions

The "Fusion" retort for the low-temperature treatment of coal, oil-shales, torbanite and other suitable material, is described. The principal feature of this retort is the loose star-shaped breaker placed within the inner of two concentric rotating shells which, in falling back into place during rotation, delivers a succession of glancing blows which keep the heated surfaces clear of scale, further break up the material and prevent it from balling or caking, carbonising or "cracking." It is shown that this retort complies with practically all the conditions which experience has shown to be necessary for efficiency and economy in operation, and it is obvious from the details given that its first cost and cost of upkeep must be low, while only about 1 h.p. is required to drive it. The great difficulty experienced with this and other retorts of preventing escape of gas at the open end of the retort has been overcome by an ingenious flexible steel-asbestos spring joint. The vexed question of removal of moisture before admission to the retort and the possible uses of the residual products by gasification or for furnace practice in powdered form are discussed.

It is not the author's object to make comparisons favourable or otherwise with retorts of other design, and when the time is ripe further particulars of actual results and costs obtaining in practice will be published. The need for simplification of design in addition to efficiency of low-temperature retorts does not require elaboration, and it is hoped that this description, the results obtained and the technical and cost data furnished, as distinct from generalities, will be of assistance to those who are called upon to deal with the business and technical ends of low-temperature propositions. The general interest would be well served if it were possible to carry out under a competent, independent authority comparative tests with standard retorts of the various kinds presented at this meeting, using what might be termed standard raw materials in each case.

* C. J. Goodwin, *J. Soc. Chem. Ind.* 38, 213-222T.

The Building Trades Exhibition

Some Exhibits of Chemical Interest

As briefly indicated in THE CHEMICAL AGE last week, the Building Trades Exhibition, which is being held at Olympia, London, until April 27, contains a number of exhibits which are of interest to chemical and allied industries. An extensive programme of meetings and conferences has been arranged, and includes papers on "Concrete," under the auspices of the Concrete Institute. On April 24 Dr. J. W. Mellor will lecture on "Gas Firing" at a conference of the Institute of Clayworkers, and this will be followed by a paper on "Automatic Conveyors," by Mr. Sidney Higgins.

Empire Runways, Ltd., of 46, King William Street, London, exhibit a steel tubular track on the Coburn system, within which trolleys are run. This apparatus is useful for the mechanical handling of materials, and is adaptable to suit differing conditions.

Plaster Paint, Ltd., of 17, Percy Street, Tottenham Court Road, London, who are the sole concessionaires for the World for "Cæmentum" paints, show samples of "Dieppe" paint on various materials illustrating its anti-corrosive, insulating and acid-resisting properties. The insolubility of these paints under extreme conditions is demonstrated by tests in boiling water.

Claimed to be one of the purest limes produced for chemical, agricultural, and building purposes, the Leckhampton lime, shown by Leckhampton Quarries Co., Ltd., near Cheltenham, is said to contain 95.38 per cent. lime. The Moler Fireproof Brick and Partition Co., Ltd., of Vickers House, Broadway, Westminster, London, are again showing their fireproof bricks, which are manufactured from diatomaceous earth. Some of the possibilities of this material in oven insulation and other industrial uses are indicated. The exhibit of Kerner, Greenwood & Co., Ltd., of King's Lynn, consists chiefly of apparatus and models which demonstrate the practical applications of the "Pudlo" brand cement waterproofer. This powder will, it is claimed, render Portland cement absolutely impervious to water under pressure.

"Becco-Legg" automatic continuous water softeners and purifiers are to be seen at the stand of the Becco Engineering & Chemical Co., Ltd., of 158-160, City Road, London, The makers claim that this plant eliminates all iron-corroding salts. Bell's United Asbestos Co., Ltd., of 59½, Southwark Street, London, have a pavilion the roof of which demonstrates the uses of the various forms of "Poilite" roofing, the sides of the building also being utilised to indicate the use of "Poilite" sheets for this purpose. In addition to the Sturtevant turbine vacuum cleaning plants, heating and ventilating plants, blowers and exhausters, the Sturtevant Engineering Co., Ltd., of 147, Queen Victoria Street, London, show various types of cleaning tools for different surfaces. Samples of "Ironite" cement for flooring are shown by the Ironite Co., Ltd., of 9 and 11, Old Queen Street, Westminster. The firm also supply "Marion" steam and electric shovels, concrete mixers, bottom-dumping wagons, &c. The exhibit of Major & Co., Ltd., of Sculcoates, Hull, demonstrates the possibilities of "Solignum," which is principally used as a preservative for all outdoor woodwork above and below ground, and as a preventative of dry-rot, &c.

The Cement Marketing Co., Ltd., who form the selling organisation of the Associated Portland Cement Manufacturers, Ltd.,

the British Portland Cement Manufacturers, Ltd., Martin Earle & Co., Ltd., and the Wouldham Cement Co., Ltd., show samples of the companies' Portland cement; cement at various stages of its manufacture; samples of cement ground to various degrees of fineness, &c. Practical tests are carried out on the stand with a complete testing apparatus conforming with the requirements of the revised British Standard Specification. Sutcliffe, Speakman & Co., Ltd., of Leigh, Lancs., are showing their "Emperor" press, which is specially adapted for briquetting ores, flue-dust, &c. The exhibits of the Ransome Machinery Co. (1920), Ltd., of 16, Grosvenor Gardens, London, include an extensive range of concrete mixers, tar macadam plant, &c.

Sidney Smith & Blyth, Ltd., of 35, Garratt Lane, Wandsworth, London, show a number of appliances of interest to paint and chemical manufacturers. These include their patented "Whirlpool" paint-mixers (10 and 30 gallons); a special ball-bearing mill for paint, drugs, &c., fitted with porphyry rolls; and an overhead paint plant, 18 in. diameter, consisting of two "Hory" paste-mixers, mounted over one 9-in. roller-mill.

A New Pigment

The exhibits on the stand of R. W. Greeff & Co., Ltd., of Thames House, Queen Street Place, London, illustrate the preparation, properties, and uses of a remarkable new pigment known as Titanium White. Specimens are shown illustrating the method of manufacture from Ilmenite, the titanium ore from which the pigment is derived. The durability of paints prepared with this pigment is demonstrated by the exposure tests exhibited, in which panels painted with Titanium White and other pigments have been exposed to the weather under identical conditions. The extraordinary opacity of the pigment is demonstrated by specimens in which it is painted out side by side with other pigments over coloured backgrounds. Titanium White is claimed to be absolutely non-poisonous and superior to white lead for general painting. Messrs. Greeff are sole agents for Great Britain for this product, which is manufactured by the Titan Co., A/S Fredriksstad, Norway.

Photographs of a number of typical machines are exhibited by Millars' Timber & Trading Co., Ltd., of Pinners' Hall, Gt. Winchester Street, London. Their manufactures include portable crushers and bins, petrol-driven diaphragm and centrifugal pumps, air compressors, steam shovels, &c.

Burt, Boulton & Haywood, Ltd., of Salisbury House, London Wall, have an interesting display of their coal-tar products, including disinfectants, wood preservatives, and insecticides.

Paints and Varnishes

Among the firms showing paints, enamels, and varnishes are the Gelesco Paint Co., of Brentford, who display paints, enamels; and liquid driers, and G. M. Callender & Co., Ltd., of 25, Victoria Street, Westminster, whose exhibit includes a rust-preventing paint known as "Bitusol," and which is claimed to be very effective for all exposed iron and steel work. A rust-preventing varnish and "Peterlineum," a wood preservative (formerly called Carbolineum), are shown by C. A. Peters, Ltd., of Derby. Hadfields (Merton), Ltd., of 63, Regent Street, London, are again showing their "Heolin" colours and varnishes, while the familiar H. M. S. Endeline of Thomas Parsons & Sons, of 315, Oxford Street, London, illustrates the practical uses of their paints, enamels, and varnishes. One of the most striking stands in the exhibition is that of W. Harland & Son, of Merton, London. Specimens of their varnishes, enamels, and fine colours are supplied on panels placed in various parts of the stand. Walter Carson & Sons, of Battersea, London, have a large display of their specialities, which include graphite and aluminium paints and Vitrolite, which is a substitute for white lead for outside and inside use. Cuirass Products, Ltd., of 69, Victoria Street, London, show samples of metal subjected to immersion in 50 per cent. sulphuric acid, alongside samples coated with "Cuirass" anti-corrosive paint subjected to the same test.

Railway Rates. Unenumerated Articles

At the last meeting of the Railway Rates Advisory Committee to hear further objections to the railway companies' proposed classifications it was decided that unenumerated articles and articles not specified would fall in Class 20. The committee also decided that soapstone, French chalk or talc, raw, ground, or unground, for industrial purposes, should go in Class 9; and e. o. h. p., Class 18.

March Trade Returns

Encouraging Increase in Chemical Exports

As briefly reported in The Chemical Age last week the Board of Trade returns for March indicate a considerable increase in the imports of raw materials and a somewhat encouraging accentuation of the upward movement in trade. January and February. Taking into consideration the difference in price levels it is apparent that the volume of trade during March was greater than in the corresponding month last year. Exports in March were only 3.3 per cent. less than in March, 1921, while re-exports were practically identical in value with those of February, and substantially higher than in January, 1922, or March, 1921. The following table gives the respective totals for March and February this year, and March of last year:

	Imports.	Exports.	Re-exports.
March, 1922	87,879,424	64,580,793	10,153,612
February, 1922	69,374,882	58,335,110	10,174,160
March, 1921	93,741,654	66,808,961	8,888,005

Imports of chemicals, drugs, dyes and colours at £1,054,711 were £210,825 in excess of the February imports, while the value of exports under this heading, at £1,692,973, were £136,089 more than the previous month's total. Compared with the totals for March, 1921, the imports were £222,024, and exports £228,833 less.

Imports of Chemicals

Dealing with quantities and making a comparison between March and February of this year large increases are apparent under borax and potassium compounds. Several items show moderate increases, while the decreases, with the exceptions of sodium nitrate are mainly small. The detailed figures, in cwts., unless otherwise stated, are given below with the February figures in parentheses. Increases: Tartaric acid (including tartrates not elsewhere specified), 502 (451); borax, 6,427 (500); calcium carbide, 60,492 (45,172); red lead and orange lead, 1,712 (1,229); potassium nitrate, 13,312 (3,501); potassium compounds other than nitrate, 519,448 (300,275); and sodium compounds other than nitrate, 11,505 (9,516). Decreases: Acetic acid (including acetic anhydride), 218 tons (253); bleaching materials, 1,985 (2,376); crude glycerine, 2,602 (3,168); distilled glycerine, 682 (778); sodium nitrate, 62,178 (124,756); cream of tartar, 4 (24); and zinc oxide, 455 tons (465).

Improvement in Tar Oil and Creosote

The feature of the month's exports is the brisk recovery of tar oil, creosote, &c., to 2,608,226 gallons as against 195,397 in February and 2,568,359 in March last year. Sulphate of ammonia show a small increase while the figures for sulphuric acid, bleaching powder, copper sulphate and zinc oxide indicate a steady recovery. The big drop in sodium compounds continues, the decline since February amounting to no fewer than 163,526 cwt. In this connexion it is interesting to note that the present low total of 522,446 cwt. is 301,078 cwt. more than the quantity exported in March, 1921, and is only 66,007 cwt. less than the amount shipped in the corresponding month of 1920. The following figures show in detail the products, the March exports of which were larger than in the preceding month: the February figures are given in parentheses, and the amounts are in cwts., unless otherwise stated: Sulphuric acid, 8,138 (6,990); tartaric acid, 443 (234); ammonium sulphate, 12,868 tons (11,751); bleaching powder, 16,078 (11,654); benzol and toluol, 7,120 gallons (4,767); naphtha, 2,054 gallons (1,083); tar oil, creosote, &c., 2,608,226 gallons (195,397); copper sulphate, 6,664 tons (3,942); potassium nitrate, 1,509 (600); caustic soda, 110,598 (96,105); and zinc oxide, 249 tons (127). The decreases, similarly compared are: Ammonia chloride (Muriate), 287 tons (508); anthracene nil (20); carbolic acid, 8,655 (11,073); naphthalene, 1,003 (2,546); coal tar products not elsewhere specified, 27,563 (29,474); crude glycerine, 1,058 (2,274); distilled glycerine, 815 (1,808); potassium chromate and bichromate, 1,973 (2,005), potassium compounds, other than chromate, bichromate and nitrate, 1,127 (5,656); sodium carbonate (including soda crystals, soda ash and bicarbonate), 327,563 (477,307); sodium chromate and bichromate, 1,989 (2,823), sodium sulphate (including saltcake), 45,724 (68,556); and sodium compounds, other sorts, 36,572 (41,281).

Dyes and Dyestuffs

As in the case of January and February there were no imports of coal tar intermediates, there was a decrease of over

4,000 cwt. in imports of alizarine dyestuffs, and the total weight of finished dyestuffs imported was practically only half that of the previous month. Extracts for dyeing—with the exception of natural indigo—all show considerable increases, the chief being tanning extracts which are 54,237 cwt. more than they were in February. The comparative figures in cwts. are: INCREASES: Finished coal tar dyestuffs other than synthetic indigo and alizarine 3,363 (2,321); cutch, 4,875 (1,356); extracts for dyeing, all other sorts, 12,242 (5,642) and tanning extracts (solid or liquid); 115,112 (60,875). DECREASES: Alizarine 107 (4,231); and natural indigo, 163 (239). Our growing independence of imported dyestuffs is reflected in the totals of finished coal tar dyestuffs imported in March 1920, 1921, and 1922, the figures being 13,074 cwt., 9,805, and 3,479 cwt. respectively.

There was an increase in exports of dyes during March, the total being 7,222 cwt., valued at £50,090 as compared with 6,916 cwt. of the value of £48,257 exported in February. In March 1921 less than double the quantity of dyes was exported, but the value was very nearly four times greater.

There was an increase of 20,228 cwt. in the imports of painters' colours and materials, and an increase in exports of 19,668 cwt. The comparative figures are: IMPORTS: Barytes, ground (including blanc fixe), 42,471 (28,087); white lead (basic carbonate) 7,756 (7,755); and other sorts 41,260 (34,517). EXPORTS: Barytes, ground (including blanc fixe) 8,172 (4,540); white lead, 18,397 (11,025); paints and colours ground in oil or water, 17,486 (16,246); paints and enamels, prepared (including ready mixed), 14,593 (15,707); and painters' colours and materials, other sorts, 44,488 (35,950).

Scientific Instruments and Glassware

Scientific glassware (except tubing and rod) was imported to the value of £4,903 against £5,194 in February, while 247 cwt. of glass tubing and rod valued at £1,301 were imported as compared with 177 cwt. of the value of £820 imported in the previous month. Exports of tubing and rod totalled 47 cwt., worth £478, against 32 cwt., of the value of £285 shipped in February. We imported 101,187 gross of bottles and jars as against 70,221 gross and exported 24,823 gross as compared with 23,227. Scientific instruments and appliances (except electrical) were imported to the value of £38,267 against £19,925 whilst the exports under this heading totalled £180,128 as against £149,755.

Coal exports were 1,186,901 tons more at 5,201,235 tons, and were worth £5,785,310 as compared with £4,446,225.

Society of Chemical Industry

Annual Meeting of Manchester Section

THE annual meeting of the Manchester Section was held at the Textile Institute, on Friday, April 7, Dr. E. Ardern presiding. There were five retiring members of the local committee, and as there were eight nominations to fill the vacancies, a ballot was necessary. Dr. Dunningham and Dr. Campbell were appointed scrutineers, and the following gentlemen were elected: Dr. T. Callan, Dr. H. F. Coward, Mr A. Grounds, Mr. E. Melling, and Dr. F. M. Rowe. Mr. H. C. Clanahan and Mr. G. Stevens were reappointed auditors. The reading of the hon. secretary's report concluded the business, and the usual monthly meeting was then held.

Economic Development of Fuel Oil

Professor J. S. S. Brame, president of the Institution of Petroleum Technologists, then read a paper on "The Possible Economic Development of Home Supplies of Fuel Oil," in which he reviewed, at some length, the published proceedings and findings of the "Crewe" Committee and the Department of Petroleum Research.

A committee of inquiry appointed in 1918, by the Institution of Petroleum Technologists, investigated the quantity of cannel coal available in Great Britain as the source of motor spirit, fuel oil, &c., and formulated a scheme for the utilisation of such supplies. They were satisfied that at least 1,200 tons per day of retortable material could be economically assembled for treatment, provided the necessary facilities were given by the Government and the requisite labour was available, at an average of 30 gallons of oil per ton, thus giving a yield of 300,000 gallons of crude oil daily or upwards of 400,000 tons a year.

The conditions which existed in wartime, and, which probably justified the small attempt made in this country to produce fuel oil, did not exist to-day. The difficulty then was shortage of labour; the problem to-day was shortage of work. Any scheme which appeared to promise a possibility of providing labour, and at the same time be the means of producing valuable commodities like liquid and smokeless fuels, was worthy of serious consideration. In view of the large power stations which it was proposed should be installed throughout the country, the question of the utilisation of retorted residues for power production became of increased importance.

The world's demand for fuel oil had gone up by leaps and bounds during the past five years. There had been a certain proportionate increase in production, and the Anglo-Persian Oil Co. had now established refineries at Swansea, while another company had established others at Southampton. In 1920 the output of oil was about 97 million tons. On the basis of the recommendations of the committee of inquiry of the Institution of Petroleum Technologists, 100 million gallons of crude oil could be produced per annum. A considerable proportion of it, however, would not be suitable for use as fuel oil, as it contained pitch which would have to be left behind by distillation. Possibly 60 per cent. of the total oil obtained would be suitable as liquid fuel. Another drawback in the case of oils obtained by low-temperature distillation was that they were somewhat rich in tar acids, thus detracting considerably from their calorific value. It would not pay to separate out tar acids. Another point was that the oils became a butter-like mass owing to the presence of wax. They, therefore, required cracking.

Professor Brame then dealt briefly with the position of the Scottish shale oil industry, and mentioned the shale deposits which outcropped in Dorset and Norfolk. In the case of the two latter there was a high sulphur content of from 7 to 8 per cent. which it was extremely difficult to eliminate by chemical treatment.

Low-temperature Carbonisation

Dealing with low-temperature carbonisation of coal, Professor Brame referred to the report of the Nitrogen Products Committee issued in 1918. This committee pointed out that if the whole of the 35 million tons of domestic coal consumed in this country were substituted by low-temperature coke it would mean that 54 million tons of coal would have to be carbonised. The yield of tar, at 18 gallons per ton would be 972 million gallons, and of light spirit, counting 2.25 gallons to the ton, would be 121.5 million gallons. He fully believed that the commercial unit for carbonisation at low temperatures had been arrived at in more than one instance. The idea of carbonising coal with the object of obtaining a smokeless fuel was not new; it was discussed as long ago as 1656.

Having indicated the main points of patents taken out for the production of smokeless fuel down to the time of Thomas Parker (1890), the lecturer explained the construction and method of operation of the "Tozer" patent retort, the "Chiswick" screw retort, the "Smith" plant, and the "L. M. N." system. The Nitrogen Products Committee stated that there was no commercial practice in this country upon which definite reliable data could be formulated as to costs and average yields, though they published some extremely valuable information relating to low-temperature carbonisation with subsequent gasification of coke. The figures given, however, must be accepted with a certain amount of reserve as the results indicated were those of only two systems, the "Tozer" and the "Chiswick."

Torbanite in the United Kingdom

Although there was probably very little torbanite in this country, yet it contained material which was very rich in oil. Bastard cannels were usually high in ash content, but they were undoubtedly retortable material. Mr. Cunningham Craig considered that there were very few of the remaining cannels which would yield 50 gallons of oil to the ton, but many of them would yield 40. The worst of the bastard cannels would yield something between 20 and 25 gallons, and whether it would pay to retort them depended largely upon the utilisation of the gas which might be obtained from the carbonaceous material left in the residue.

American scientists had shown that if coal was distilled under high pressures, with a reflux arrangement fitted to the retort, there was condensation of the higher boiling fractions and dropping down into the retort, and there could be cracking of a larger quantity of the phenolic bodies into lighter spirits. Cannel oils were a different type of material from that obtained from the low-temperature tars. The coke from bituminous material was not the same as from cannel and canneloid substances, owing to the presence of paraffin wax. It was a

doubtful proposition whether it would pay to extract the paraffin wax, and it had the great disadvantage of establishing a high setting point which might be 30°C. Low-temperature oils sometimes held water in a most persistent way, and in some cases it appeared to be in a perfect state of solution.

Railway Rates Advisory Committee

Railway Companies' Proposed New Classification

THE Railway Rates Advisory Committee recently considered objections to the new railway classification proposed for particular classes of machinery. The general question of machinery was first gone into at some length. It is proposed by the railway companies that machinery generally should be put into Classes 12, 14, and 16 of the new classification. For consignments of less than 2 tons in weight they are to be charged at the Class 16 rate, consignments above 2 tons should be charged by the Class 14 rate, and consignments over 5 tons at the Class 12 rate. An application was made by the Traders' Co-ordinating Committee that machinery should be differentiated and spread over a larger number of classes. After careful consideration, however, the committee decided that machinery should remain in the classes proposed by the railway companies.

Consideration was then given to particular pieces of machinery respecting which various traders complained, among whom were the Society of British Gas Industries. Mr. Holt, representing the Society, first asked that coal- and coke-breaking machinery should be placed in a lower category than the machinery classes proposed by the railway companies. The committee could not see any reason for taking this machinery out of the general machinery classes.

At a later stage Mr. Holt dealt with coal and coke conveyor chains, which were at present in Class 1, and which the railway companies proposed to put into Class 18. He asked that the chains should be included in the general machinery classes, and the railway companies agreed to do this.

Dealing with gas scrubbers, Mr. Holt said they were at present in Class 1, and it was proposed to put them into Class 16. The committee decided that gas scrubbers were properly included in the general machinery classes.

Mr. Savage (Tangyes, Ltd.) made an objection with regard to gas plant, suction, complete in parts. It was contended that, in the first place, this plant was not machinery, and should go into classes lower than 12, 14, and 16. The Chairman said the Committee did not see anything to distinguish it from other machinery in Classes 12, 14, and 16.

The Industrial Use of Fuel Oil

Results of Comparative Tests

AT a meeting of the London Section of the National Federation of Launderers on April 5, Mr. G. Turner, a member of the Institution of Petroleum Technologists, read a paper on "Fuel Oil," in which he gave the physical and chemical tests of Mexican fuel oil as follows:—Specific gravity, about .95 at 60°F.; flash point (open), over 150° F.; viscosity, about 1,500 secs. (Redwood No. 1), at 100° F.; calorific value about 18,750 B.T.U.'s per lb.; sulphur percentage approximately 3.5 per cent. One of the Mexican Eagle Oil Company's refineries, situated at Tampico, was capable of turning over 35,000 barrels to 40,000 barrels of crude petroleum daily into complete range of high-grade products.

For the purpose of obtaining the comparative values of oil and coal as fuel, tests were made at a large London factory, where Lancashire boilers were converted from coal-firing to oil-firing. It was found that when using fuel oil the evaporation per lb. of fuel was doubled, and the boiler rating was increased over 100 per cent. The temperature of the boiler-house was also much lower. Efficiencies as high as 84.5 per cent. had been obtained in this country on Lancashire boilers, using Mexican fuel oil with the pressure system of oil burning. In the United States during 1915-17 actual working tests were carried out in large mills, and the thermal efficiency of boilers using coal varied from 66.6 to 68.1 per cent., while that of boilers using oil showed from 80.6 to 81.5 per cent. efficiency. With the air jet system of atomisation the proportion of air to oil was 15 to 1 by weight. These tests gave very satisfactory results, and eventually further tests were carried out under a coal-fired Stirling water-tube boiler at a London power station. One burner was introduced into each side of the boiler, approximately about 25 per cent. of the grate length from the back, the burners being opposite each other. The fuel oil was stored in an overhead tank capable of holding three or four days' supply. The oil then gravitated to the burners, which were of the Kermode steam jet type, operating with steam as an atomising agent at a pressure of about 25 lb per sq. inch. The coal test was carried out on a nutty slack, having a calorific value of 10,400 B.T.U.'s, and a boiler efficiency of 69.25 per cent. was obtained. The temperature of the combustion chamber was 2,648°F., and the uptake 660°F.

The Electrical Trades' Directory

THE fortieth edition of "*The Electrician* Electrical Trades' Directory and Handbook," the well-known Blue Book, is now available. The new issue, which has undergone careful revision, has grown in size by about fifty pages; about 1,000 more firms and names have been included in the Alphabetical Section, and corresponding additions have been made to the Classified Trades portion. In the alphabetical section will be found the name, trade or professional description and address of practically everyone engaged in or connected with the Electrical and Allied Trades, while under the headings in the Classified Trades there are very full and representative lists of persons and firms engaged in the manufacture, supply, or erection of electrical plant and apparatus. The Colonial and Foreign sections have also undergone similar expansion and revision.

The Handbook Section contains much valuable technical, commercial, and legal information relating to the electrical industry, including a number of electro-technical tables and data, particulars of resistance materials, electric supply cables, wire gauges, aluminium data, illumination notes, &c. Particulars are also given of the work of the British Engineering Standards Association and of the International Electrical Commission, the Imperial ohm, ampere and volt, the Standardisation Rules of the British Electrical and Allied Trades Association, details of the import duties leviable on electrical machinery in the British Dominions and Colonies and in foreign countries.

A special feature of the Handbook Section of the Directory is the full Digest of the Law of Electricity Supply and Electric Traction, and the present issue includes all the latest Regulations, Orders, and requirements of the Electricity Commissioners and of the Ministry of Transport relating to electric supply powers and the operation of electric tramways. The Regulations as to the use of electricity in Mines and Factories are also given.

The Directory and Handbook has now reached its fortieth year, and with each succeeding issue its utility, influence and circulation have grown. For many years the Blue Book has been the recognised work of reference for the whole of the electrical industry, and it is felt that the improvements effected in the present edition will insure for it an even warmer welcome than that accorded to previous issues. It is published at 25s. net by Messrs. Benn Brothers, Ltd., 6 and 8, Bouverie-street, London, E.C. 4.

Contracts Open

TENDERS are invited for the supply of the following materials. The latest date for receiving tenders is (when available) given in parentheses:

SWINDON.—(May 5.)—Plant for sewage purification works. Particulars from Mr. G. M. Taylor, 36, Victoria Street, Westminster. Tenders to Town Clerk, Town Hall, Swindon.

HEMEL HEMPSTED.—(April 26.)—Refined tar (12,000 gallons).—Forms from and tenders to Mr. W. R. Locke, Market Square, Hemel Hempsted.

SALFORD.—Reciprocating pumps for sewage works. Forms from J. Diggle and Son, 14, Brown Street, Manchester.

HALIFAX.—Rotary screen, picking belt, hoppers, conveyors, briquetting plant, &c. Particulars from Mr. W. H. Sagar, Hall Street, Halifax.

YEOVIL.—Proposed new water-gas plant. Condensers, &c., at Corporation gasworks. Particulars from the Town Clerk, Yeovil.

GLASGOW.—(April 26.)—Soap, soda, oils, paints, and varnishes. Forms from Mr. R. B. Thomson, 38, College Street, Glasgow. Tenders to Mr. J. Lindsay, City Chambers, Glasgow.

LONDON.—(April 24.)—Disinfectants and chemicals. Forms from and tenders to Town Clerk, Public Health Department, Guildhall, London.

Chemical Matters in Parliament

Dyes for Film-Tinting

Replying to Mr. Newbould (House of Commons, April 12), Sir W. Mitchell-Thomson said he understood that some manufacturers of cinematograph films in this country were using British dyestuffs for tinting and colouring purposes, with satisfactory results. If these dyes appeared to them to be unsatisfactory they should furnish the dye makers with specific statements.

Referee's Judgment

In reply to Mr. Galbraith (House of Commons, April 12), Sir W. Mitchell-Thomson said he was aware of the judgments of the Referee regarding santonine, cream of tartar, and sugar of milk. The hearings in two out of the three cases could hardly be described as prolonged, but there was naturally some temporary disturbance to trade and uncertainty in connexion with such cases. The Board of Trade obtained technical advice from the Government Laboratory, the Patent Office, and other sources, and the relatively small number of complaints to be dealt with by the Referee seemed to indicate that the lists of commodities which they issued were based on adequate technical information. There seemed to be no occasion for obtaining further technical advice to ascertain if some other procedure could be devised.

Coal Smoke Abatement

Sir A. Mond informed Sir A. Holbrook (House of Commons, April 12) that a Bill giving effect to the recommendations of Lord Newton's Departmental Committee on coal-smoke abatement was being prepared, but he could not say whether it would be possible to find time for its introduction.

Substitutes for Hydrogen

In reply to Captain Bowyer, who drew attention to the new non-inflammable gas, known as currenium, Mr. Amery (House of Commons, April 12) said the Admiralty were watching progress in experiments with non-inflammable substitutes for hydrogen as a filling for airships, but the active pursuit of this question would no doubt be considered by the Secretary of State for Air should he decide to re-establish an airship service.

Scheduled Articles

Sir W. Mitchell-Thomson (House of Commons, April 12) informed Mr. Kiley that the machinery set up by the Safeguarding of Industries Act for testing the correctness of the lists issued by the Board of Trade was specially designed with the view of eliminating unnecessary expense, and the rules of procedure laid down by the Referee were framed with a similar view. Complainants, who incurred heavy expenses, did so on their own initiative. He was therefore not prepared to reimburse the complainants the costs to which they had been subjected in establishing the fact that the responsible officers of the Board of Trade acted improperly in placing such articles on the list.

Opening of Packages

Replying to Mr. C. White (House of Commons, April 12), Mr. Young said no charge was made by H.M. Customs for opening packages to ascertain whether the goods were liable to duty.

Price of Reparation Dyes

Major M. Wood (House of Commons, April 12) asked the President of the Board of Trade if he was aware that the principal calico printers in this country could not maintain their export trade unless they could buy high-grade dyes essential for their products at prices at least approximately as low as the prices paid by their competitors abroad; and whether he would see that the prices at which dyes received by the Government in payment of reparation were sold in this country were not higher than the prices at which similar dyes could be obtained by dye-users in Germany, America, and other countries.

Sir W. Mitchell-Thomson said in reply to the first part of the question, he would point out that the cost of dyes was only one element, and, in most cases, not the principal element, and in the cost of producing the goods referred to, the prices at which German reparation dyes were sold were fixed after consultation with the manufacturing and consuming interests concerned, and approximated as closely as practicable to current market values. The suggestion contained in the second part of the question would not be practicable.

Customs Clearances

In reply to Mr. C. White (House of Commons, April 12), Mr. Young said that pending the final decision, immediate delivery of goods could be obtained on a deposit being made with the Customs Departments to secure any duty which might prove to be chargeable, and he was not prepared to take steps to ensure that the shipping documents, and, if necessary, a sworn declaration by the importer, should be sufficient proof to enable the Customs to give a quick release and delivery. The necessity of making a deposit might, in some cases, increase the amount of capital required in business. On the other hand, it was a very convenient method of dealing with the situation.

Duty on Containers

Mr. Young (House of Commons, April 12) informed Mr. Kiley that no duty was charged on casks, barrels or other containers as such, but in the case of goods dutied on an *ad valorem* basis the statutory value for duty was the price which an importer would give for the goods delivered, freight and insurance paid, in bond at the port of importation. This price would include the cost of packing and of the containers, if any.

Affairs of the Elstree Chemical Works

PURSUANT to Sec. 185 of the Companies (Consolidation) Act, a meeting of the creditors of the Elstree Chemical Works, Ltd., Elstree, Herts, was held on April 13, at 54, New Broad Street, London. The company recently went into voluntary liquidation (*see* THE CHEMICAL AGE, Vol. VI., p. 427). It was explained that the company was formed in 1919 to exploit a secret process for the manufacture of fertilisers, in which waste leather and cotton were largely employed The company had been hit by very adverse trading conditions, and had been unable to carry on at a profit. The business had been financed throughout by Sir Harry McGowan, who had advanced something like £18,000 in cash for the purpose of the company's business. Owing to the state of the business, Sir Harry McGowan recently appointed a receiver to act for him. The receiver, Mr. Burleigh, was in attendance at the meeting and explained the position. He said there were virtually no realisable assets, and acting under his powers of sale, he had recently completed arrangements for the sale of the assets of the company, to another company, which was being formed with a capital of £20,000 of which £4,000 was represented by preference shares, and which were being paid for in cash. The remaining £16,000 were in ordinary shares and these would automatically go to Sir Harry McGowan; but Sir Harry had elected to accept 5,000 of these shares in satisfaction of his claim, and was desirous that 11,000 shares should be allotted to trustees who should act on behalf of the unsecured creditors and who might perhaps get the benefit of improved business conditions should these result as a consequence of the new company's operations. It was stated that the total account due to unsecured creditors was £1,400, while there was one large cash creditor for £2,240. The meeting was only attended by one or two creditors, and in the result no resolutions were passed and the voluntary liquidation will, therefore, remain in the hands of Mr. O. A. Hibbert, and in due course Mr. Hibbert will, it is presumed, notify the creditors as to what has been done in pursuance of the scheme already outlined for the appointment of trustees of the shares which are to be held on behalf of the unsecured creditors. It was suggested that the present liquidator and Mr. Martell should be the trustees under the scheme referred to.

Adsorption in Flotation

IN the course of the studies of adsorption in flotation, being conducted at the Moscow, Idaho, office of the U.S.A. Bureau of Mines, the following-named substances have been investigated—Sunny South "C" pine oil, G N S No. 5 pine oil, s.d.; Burgess green camphor oil, Barret Co. No. 2, coal tar oil; Cleveland Cliffs No. 1, hardwood creosote; Oleic acid. If a layer of oil is placed on top, or under water, some of the oil will diffuse into the water and some of the water into the oil, becoming either a solution of the oil in water or an emulsion of the oil-in-water or both. As the water becomes decidedly turbid there seems to be no question but that it becomes an emulsion after a certain amount of oil has diffused into it. The clear oil phase also becomes turbid, showing no doubt, an emulsion of water-in-oil.

From Week to Week

MR. FREDERICK YOULDON, importer and exporter of glass bottles, announces that his offices are now at Portland House, 73, Basinghall Street, London.

The April monthly meeting of the CHEMICAL INDUSTRY CLUB will be held on April 24, at 8 p.m., when Mr. W. Perry will read a paper on "Cotton from Plant to Fabric."

The Academic Registrar of the University of London announces that application for grants from the Dixon Fund or ASSISTING SCIENTIFIC INVESTIGATIONS must be made to him before May 15.

The death is announced from Germany, at the age of sixty years, of PROFESSOR RENÉ BOHN, a director of the Badische Anilin u. Sodafabrik, and one of the pioneers of the German coal-tar dye industry.

There will be a discussion on the working of the SAFEGUARDING OF INDUSTRIES ACT in the House of Lords on May 4, when Earl Beauchamp will call attention to the measure and move a resolution.

CAPTAIN C. J. GOODWIN, chemical engineer, of 7 and 8, Idol Lane, London, is leaving at the end of April for a business tour of Europe. He proposes to visit France, Belgium, Switzerland, Austria, Germany and Italy.

J. & P. Coats, Ltd., officially announce that there is NO FOUNDATION FOR THE RUMOUR that they are likely to become financially interested in or to undertake the sale of products of the British Cellulose & Chemical Manufacturing Co., Ltd.

At a general meeting of the Institute of Metals, to be held at the Institution of Mechanical Engineers on May 3 at 8 p.m., Professor Sir Ernest Rutherford will deliver the twelfth annual May lecture on "THE RELATION OF THE ELEMENTS."

At a luncheon of the City of London Tradesmen's Club held at the Cannon Street Hotel on Wednesday, LORD LEVERHULME, the principal guest, was described by Lord Beaverbrook as "the greatest industrial leader of our time, and, indeed, of any time."

The family of the late Mr. J. M. Dodds have founded at Peterhouse College, Cambridge, a studentship to be known as the J. M. DODDS STUDENTSHIP for the promotion of advanced study or research in the subject of mathematics or physics. The first election will be held in June, 1923.

United States POTASH MANUFACTURERS have submitted to Congress a petition asking protection from the underselling of the German Kali-Syndikat, which, they state, has totally destroyed the American potash industry which was built up during the war with nearly 30 million dollars of capital.

The directors of the South Metropolitan Gas Co. have decided that as from the date of the reading of meters for the June quarter, the PRICE OF GAS will be reduced from 11½d. to 10d. per therm, which, it is claimed, will make the price the lowest charged for any gas supply in and around London.

Colonel W. H. Franklin, H.M. Trade Commissioner in East Africa will be in attendance at the Department of Overseas Trade, 35, Old Queen Street, London, until April 28 for the purpose of interviewing firms interested in TRADE WITH EAST AFRICA. Applications for such interviews should be addressed to the Department and the reference No. 3658/TG. quoted.

THE INSTITUTE OF PHYSICS is arranging for a course of public lectures with a view to indicating the growing importance and place which physics now holds in industry and manufacture. The first of these lectures will be delivered by Professor A. Barr, of Glasgow, on April 26, at 8 p.m. in the Hall of the Institution of Civil Engineers. Mr. H. A. L. Fisher will preside.

The strike of chemical workers in South Wales, after lasting some seven weeks, has fortunately been brought to an end, and WORK HAS BEEN RESUMED. It arose in connexion with the employers' demand for a reduction of wages, and the settlement provides for the matters in dispute, especially the questions of grading and stabilisation to be considered in a mutual conference immediately after work has been fully resumed.

An action is to be raised in the Scottish Law Courts by Brotherton & Co., Ltd., late lessees of the Provan Chemical Works belonging to the Glasgow Corporation. The firm are suing the city for damages amounting to £97,593 11s. 2d., or alternatively for £32,287 15s. 8d., arising out of an agreement of lease between them and Glasgow Corporation for the purchase of tar and ammoniacal liquor from the Provan Gas Works.

THE ANNUAL MEETING of the Iron and Steel Institute will be held at the Institution of Civil Engineers on Thursday and Friday, May 4 and 5, commencing each day at 10.30 a.m., when the papers to be read comprise studies in the constitution of iron and steel, "British Siemens Furnace Practice," and "Recent Developments in Power Production." The newly elected president (Mr. Francis Samuelson) will deliver his presidential address at the morning session of May 4. The annual dinner will be held at the Connaught Rooms the same evening.

One of London's oldest retail businesses has just changed hands by the sale of the dispensing business of the SOCIETY OF APOTHECARIES, of Apothecaries' Hall, Blackfriars, to Cooper, Son, & Co., Ltd., of Gloucester Road, London. The society, which acquired valuable privileges by a charter in the reign of James I., will continue for the present as wholesale traders. The Mill House, which was next door to the hall, and which was demolished in 1915, contained a number of curious devices in use before the days of steam power, for grinding, weighing and preserving drugs.

Presiding at the annual meeting of the THARSIS SULPHUR AND COPPER CO., LTD., in Glasgow, on Wednesday, Mr. W. P. Rutherford said it was of interest, as an indication of the great depression in the trade of the country, that this was the first time they had to record a prolonged stoppage of their works, due to absence of demand for their products. His feeling was that the worst of the depression had passed. Two of their works had restarted. The workmen had met them reasonably, and were helping, by the wages they were willing to accept, to enable them to meet present-day conditions.

In their second annual report the GLASS RESEARCH ASSOCIATION state that a remarkable feature of the year has been the great losses sustained by the glass industry through the incidence of faulty refractories and furnace material, quite a number among the largest furnaces having been out of commission for considerable periods owing to one or both of these causes. Research has been prosecuted under the following heads:—Chemical and physical properties of glass; glass-making technique; forming operations and equipment; lampworking materials of combustion; annealing; refractories; and raw materials.

The Association of Assistants in Pathological and Bacteriological Laboratories is now admitting, as associate members, laboratory assistants from laboratories other than those of pathology and bacteriology. The organisation was founded in 1912 to improve THE STATUS OF THE LABORATORY ASSISTANT by endeavouring to raise the standard of technical knowledge through the medium of an educational programme, culminating in an examination and the granting of a certificate of proficiency in laboratory technique. The Honorary Associate Secretary is Mr. F. C. Padley, 2, Eldon Place, Reading, from whom further information may be obtained.

The report of the Council of the RUBBER GROWERS' ASSOCIATION for 1921 shows a membership of 905, consisting of 548 companies and 357 individuals. Of the companies, 531 represent an issued capital of £77,740,818, owning an acreage of 2,644,301. The report mentions that the year has involved a large amount of work for the output control committee. Although the market price of rubber averaged less than the cost of production, except in the case of companies with satisfactory forward contracts, there can be no doubt that the position of the industry would have been substantially worse had it not been for the voluntary restriction of output.

An inquiry was held at Glasgow on Tuesday into the death of four workmen engaged in the demolition of the large chimney at the St. Rollox Chemical Works, at Glasgow, which, as previously reported in THE CHEMICAL AGE, collapsed on March 10. The evidence showed that seven men were working at the top of the chimney. One man descended ten minutes before the crash occurred, and while on the ground he noticed that the iron binding hoop round the chimney had burst. He warned the other men to descend, but, before they could do so, the whole structure fell out from the top. This man escaped injury and managed to free a mate who was pinned by debris. Of the six men on top four were descending by the time the collapse occurred, and were instantaneously killed; the remaining two, who had no time to prepare to descend, were thrown down, and both landed practically uninjured in a mass of soot, being buried up to their necks. A formal verdict was returned by the jury.

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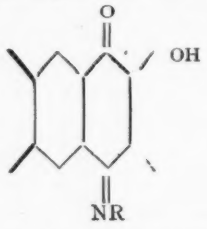
Abstracts of Complete Specifications

176,833. Dyestuffs, Manufacture of. R. B. Ransford, London. (From L. Cassella & Co., Ges. m.b.H., 50, Feuerbachstrasse, Frankfurt-on-Main and R. Herz, Eysseneckstrasse 17, Frankfurt-on-Main, Germany.) Application date, October 14, 1920. Addition to 151,000.

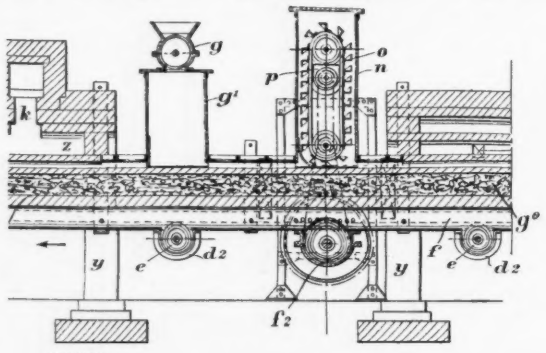
Specification 151,000 (*see* The Chemical Age, Vol. III., p. 635) describes the treatment of β-oxy-naphthoquinone-arylimido compounds having the general formula:



(where R = aryl), or their substitution products, with sulphurising agents to produce dyestuffs. These dyestuffs are now obtained by condensing sulphurised arylamines having the sulphur or sulphur-containing group in the ortho-position to the amino group, with β-naphthoquinone or a substitution product. The sulphurised arylamines employed are *o*-aminoarylmercaptans, *o*-aminoarylthiosulphonic acids, *o*-aminoaryldisulphides, and certain products obtained by the reaction of disulphur dichloride with aromatic amino compounds, and derivatives of these substances. Examples are given of the preparation of dyestuffs from (1) β-naphthoquinone or 3 : 4-dichlor-β-naphthoquinone and orthoaminothiophenol, (2) 3 : 4-dichlor-β-naphthoquinone and the product of the reaction of disulphur dichloride and aniline, (3) monochlor-β-naphthoquinone and 1-amino-2-thiophenol-4-sulphonic acid.

176,834-6. Furnaces for Producing Chemical Changes. Woodall, Duckham and Jones (1920), Ltd., and Sir A. M. Duckham 52, Grosvenor Gardens, London, S.W.1. Application dates, October 14 and October 23, 1920.

176,834. An annular muffle furnace is provided with a travelling platform and the material is charged and discharged in such a manner that the continuous operation of the furnace is not interrupted. The illustration shows a portion of a developed longitudinal vertical section. The walls are carried by longitudinal girders supported on piers *y*,



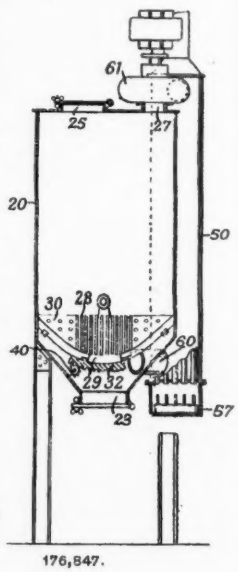
176,834.

the space between the girders being closed by a horizontal floor plate. Depending pockets *d2* are formed in this plate at intervals to accommodate rollers *e*, which support an annular girder *f* carrying an annular brickwork platform *g°*. The annular trough for the material is built on this platform, and the platform is continuously rotated by means of a driving pinion *f2*. The material to be treated is fed through a gas-tight device *g* and a shoot *g'* at a part of the muffle which is not heated by the flues, the direction of travel being from right to left. The roof of the muffle is heated by a flue *z* through which hot gases travel in the opposite direction to that of the material, to an outlet *k*. After the circuit of the furnace, the material is removed by a bucket conveyor *o* in a casing *n*. The buckets discharge the material into a horizontal airtight worm conveyor *p*. The furnace is airtight and may be used for heating material in an atmosphere of gas.

174,836. The furnace is of the above annular type, with no openings except those for the admission and escape of gases. The air parts are arranged so that the air is preheated before meeting the combustible gases.

176,847. Shale and Line Materials, Recovering the Volatile Constituents of. G. A. Bronder and T. Costigan, 150, Nassau Street, New York. Application date, November 15, 1920.

The gas or vapour produced by heating shale or the like is passed through a heater and then used to assist in heating the material. A heating chamber 20 is provided with a charging opening 25 and discharge opening 23, each of which can be closed by a door, and with a vapour outlet 27. Inclined grates 28 are arranged around a central opening 29, and the grates are connected by perforated plates 30. The opening 29 is closed by a member 32 which is operated by a pinion 40 mounted on a hand-operated shaft. Gas and vapour are withdrawn by a blower 61 and forced downwards through a heater 50 which contains a number of vertical tubes which are heated internally by the hot gases passing upwards from a burner 57. The heated gas passes through a conduit 60 and then into and through the charge in the heater 20 to vaporise the volatile portions. The gas and vapour may then be passed to a condenser. The gases may be drawn from the heater 20 through a liquid sealed outlet into the discharge main.



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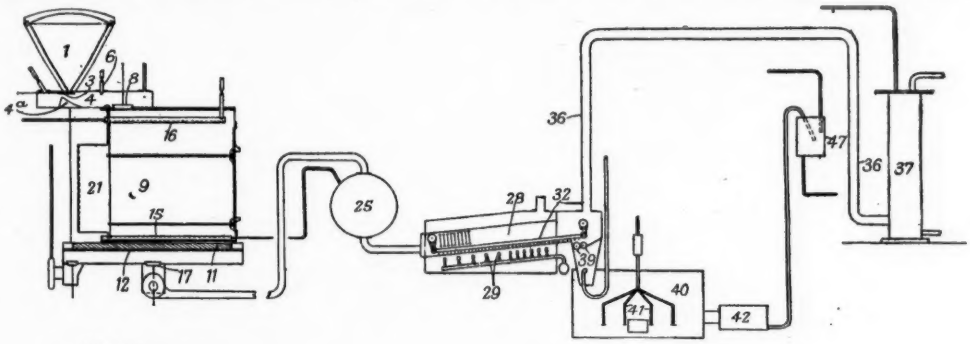
176,864. Producing Chemical Reactions by the Action of Heat. Thermal, Industrial and Chemical (T.I.C.) Co., Ltd., and J. S. Morgan, 52, Grosvenor Gardens, London, S.W.1. Application date, December 8, 1920.

Chemical reactions such as the production of synthetic phenol by the interaction of fused caustic soda and sodium benzene sulphonate are effected by causing a mixture of the two substances to travel over the surface or through a molten metal or alloy heated to the desired temperature. In some cases the molten metal itself may be one constituent of the reaction. The materials may be carried below the surface of the metal in the form of a thin film by means of a rotating drum dipping into the metal. The time of immersion is regulated so that the reaction is complete when the material emerges from the metal. In one example a mixture of benzene sulphonic acid and caustic soda is immersed for 15-30 seconds in a bath of molten lead heated to 320°C., and sodium phenate is obtained in higher yield than by other processes. In another example, sodium nitrite is obtained by fusing sodium nitrate with lead. The lead is heated to about 450°C. and the nitrate is fed through it, the period of contact being 3-5 seconds. A mixture of sodium nitrite and lead oxide is obtained, which is scraped from the drum and leached to obtain the nitrite.

176,918. Metallic Compounds from Blast Furnace and Like Slags, Process for the Extraction of. A. Collier, "Westbury," Ladysmith Avenue, Whitby, Yorks. Application date, September 23, 1921.

The object is to obtain compounds of aluminium, calcium magnesium, iron, manganese and sulphur from slag. Molten slag is tipped into a receiver 1 closed at the bottom by a horizontal sliding door 3. The molten slag is discharged from

the receiver in a wide stream or film, of not more than ¼ in. in thickness, into hydrochloric acid which flows over an incline 4a in a closed chamber 4. The slag and acid react to produce chlorides of aluminium, magnesium, iron, manganese, and calcium. Sufficient sulphuric acid is then admitted through the inlet 6 to react with the calcium and magnesium chlorides and produce a precipitate of calcium sulphate. The mixture then passes through a valve 8 to a closed tank 9 having filtering material 11 at the bottom supported by a perforated pipe 12. A steam agitating device 15 is provided at the bottom and a liquid spray 16 at the top. The liquid is withdrawn through the valve 17 and the precipitate is washed with hydrochloric acid and then with



176,918.

water. The precipitate is withdrawn by means of hinged plates 21. The liquor passes to a boiler 25, where it is concentrated, the steam being used for the agitator 15. The concentrated liquor passes to a long tubular chamber 28 inclined at about 5° to the horizontal and heated by burners 29. The liquor is evaporated to dryness in the lower part of the chamber, and the crystals are moved upwards by a mechanical rake 32 into the hotter part of the chamber, where they are ultimately subjected to a red heat. Aluminium chloride is converted into aluminium oxide and hydrochloric acid, while iron chloride is partly converted into the oxide and partly volatilises. Manganese chloride is converted into the oxide, and the magnesium chloride reacts with the sulphuric acid to yield the sulphate. The hydrochloric acid evolved passes through a pipe 36 to an absorption tower 37, and is used over again. The solid residue in the chamber 28 is crushed between rollers 39 and delivered to a tank 40 containing warm water. The mixture is washed by means of agitators 41, yielding magnesium sulphate and a mixture of oxides. The magnesium sulphate passes through a filter 42 to a vessel 47, where it is treated with ammonia to precipitate any iron and alumina as hydroxides. The solution of magnesium and ammonium sulphates is filtered off and recrystallised.

176,924. Lead Oxides and Process of Manufacture. G. Shimadzu, 420, Higashitoin-Miikeagaru-Funayamachi, Kamikyo Ku, Kyoto, Japan. Application date, December 30, 1920.

Litharge is obtained by the oxidation in air of very fine lead powder. The lead powder is obtained by placing lead balls in a drum which is rotated at about 25 revs. per minute. This powder has an apparent specific gravity of 1 to 3, and may be ignited by a burning match or a drop of water. The combustion continues by the heat of the reaction only, and is maintained by adding fresh lead powder. The litharge may be converted into red lead by heating to 500°C. The lead oxides are lighter and more porous than those obtained by other processes, and are more suitable for pigments.

176,925. Oxy and Sulpho-oxy Derivatives of Anthraquinone, Manufacture of. D. Segaller, D. H. Peacock, of British Dyestuffs Corporation (Huddersfield), Ltd., Turnbridge Works, Huddersfield, and British Dyestuffs Corporation Ltd., Imperial House, Kingsway, London, W.C. 2. Application date, December 30, 1920.

Phthalic anhydride is condensed with phenol or phenol para-sulphonic acid, using a sulphuric acid solution of boric acid as a condensation agent. At a temperature of 200°C. the anthaquinone oxy-sulphonic acid is obtained. A mixture of phenol and phenol-para-sulphonic acid may also be used, and the sulphonation of the phenol may be effected in the same operation as the condensation with phthalic anhydride. If the anthraquinone oxy-sulphonic acid is subsequently heated to 240°-250°C. with 96 per cent. sulphuric acid it is converted into 1 : 4-dioxy-anthraquinone or quinizarin. If this product is required, the anthraquinone oxy-sulphonic acid need not be isolated, but the original mixture may be heated to 250°C. If the sulphonation of the phenol is carried on so that the disulpho acid is obtained before condensation is effected, oxy-anthraquinone-2-4-disulpho acid is obtained. The final product is 1 : 2 : 4-hydroxy-anthraquinone or purpurin. If ortho- or meta-cresol is employed in this process instead of phenol, the final product is beta-methyl-quinizarin.

176,977. Ammonium Sulphate, Manufacture of. South Metropolitan Gas Co., 709, Old Kent Road, London, S.E. 1, and P. Parrish, 64, Foyle Road, Blackheath, London, S.E. Application date, January 24, 1921.

When ammonium sulphate, in the acid condition in which it is discharged from the saturator, is neutralised with ammonia from the fixed ammonia still, the pyridine sulphate in it is decomposed with evolution of pyridine vapour. If the saturator is worked to neutrality or slight alkalinity, the pyridine is liberated and removed with the waste gas, but the ammonium sulphate is discoloured. In this invention the ammonia from the free ammonia still and that from the fixed ammonia still are absorbed in two separators. The acid salt from the saturator worked from the free ammonia still is drained and fed into the other saturator which is then worked to neutrality or slight alkalinity. Pyridine is evolved and is recovered from the waste gases. The salt obtained from the two saturators is drained in two separate centrifugal separators, one of which is thus subjected only to the action of an acid solution and the other to the action of an alkaline solution. The apparatus is thus subjected to less corrosion than if a single centrifuge is subjected alternately to acid and alkali.

177,056. Urea, Evaporation, Concentration and Drying of Solutions of. A. L. Mond, London. From Metallbank und Metallurgische Gesellschaft Akt.-Ges., 45, Bockenheimer Anlage, Frankfurt-on-Main, Germany. Application date, March 17, 1921.

The usual method of evaporating solutions of urea in metal vessels results in corrosion of the vessel and contamination of the urea, and some urea is decomposed with formation of ammonia. These disadvantages are avoided in the present invention by distributing the urea solution as a finely atomised mist and subjecting it to the drying action of a current of air. The atomisation may be effected by allowing the liquid to impinge on a disc rotating at 10,000 revs. per min., and the temperature of the air may be 100°-170°C. It is found that with this process the loss of urea by conversion into ammonia is prevented, and complete dehydration is obtained. It is also found that the fine solid particles cake together in a granular form, which facilitates its distribution when used as a fertiliser.

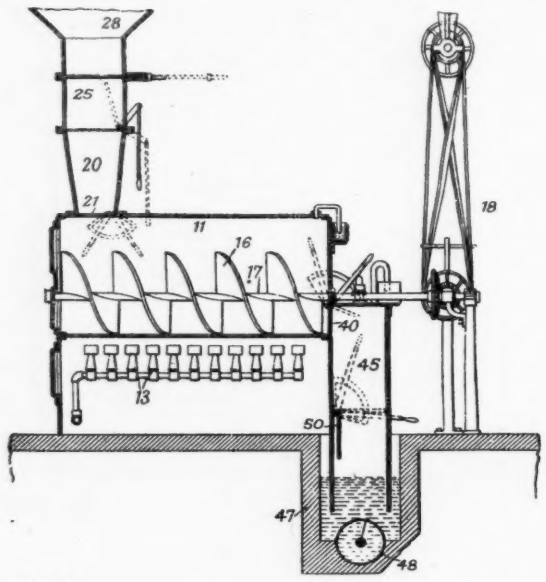
177,103. Finely Divided Sulphur, Manufacture of. J. Y. Johnson, London. From Badische Anilin & Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, July 11, 1921.

Sulphur is obtained in a very finely divided or colloidal form by evaporating a solution of ammonium polysulphide containing a protective colloid such as saponines, gelatine casein. sodium lysalbinate, waste sulphite liquor, naphthol

pitch, glycerin foots, and the like. In an example, ammonium polysulphide is run slowly into a boiling aqueous solution of soap of 0.5 per cent. strength. The milk of sulphur becomes pure white when the ammonia and hydrogen sulphide are completely removed. If the liquid is diluted to 1000-10,000 times with water, a highly dispersed bluish sol is obtained. The sulphur may be separated out as a paste or powder by adding an electrolyte or by blowing air through the liquid. The process may be modified by partly evaporating the ammonium sulphide and completing the decomposition by acidulating, and then oxidising, *e.g.*, with nitric acid.

177,123. LITHOPONE, APPARATUS FOR THE MANUFACTURE OF. J. L. Mitchell, 17, West 108th Street, Manhattan, New York. Application date, September 1, 1920.

The apparatus is for calcining the mixture of barium sulphate and zinc sulphide out of contact with air. The mixture is dried and ground, and supplied from a hopper 28 through closed chambers 25, 20 to the calcining chamber 11. The inlet and outlet doors 21, 40 are closed, and the mixture is heated by burners 13. The mixture is continually agitated by a series of spiral blades 16 mounted on a shaft 17 which is



176,123

periodically reversed by means of open and crossed belt-reversing gear 18. After about half an hour the outlet 40 is opened when the material is being moved towards it, so that it is discharged into a chamber 45 closed at the bottom by a door 50. The material is then discharged into a trough 47 containing cold water, and withdrawn by a conveyor 48. The product is thus kept out of contact with air, both before and after calcining, so that the formation of zinc oxide is avoided.

NOTE.—Abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—153,917 (E. Merck and O. Wolfes) relating to tropinone mono-carboxylic acid esters, *see* Vol. IV., p. 134 ; 155,259 (H. Scheibler) relating to preparation of sulphur preparations of the thiophene series from tar oils, *see* Vol. IV. p. 230 ; 155,302 (L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés, G. Claude) relating to synthesis of ammonia, *see* Vol. IV., p. 230 ; 156,118-9 (H. O. Traun's Forschungslaboratorium Ges.) relating to rubber-like substances, *see* Vol. IV., p. 313 ; 156,215 and 156,538 (Chemische Fabriken Worms Akt.-Ges.) relating to anthraquinone, *see* Vol. IV., pp. 342 and 376 ; 157,223 (C. Still) relating to saturators for treating gases with liquids, *see* Vol. IV., p. 404 ; 158,558 (Chemische Fabrik auf Aktienvorm. E. Schering) relating to a diethyl-barbituric acid compound, *see* Vol. IV., p. 515.

International Specifications not yet Accepted

175,605. HYDROGEN, SEPARATING BY LIQUEFACTION. L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés. G. Claude, 48, Rue St. Lazare, Paris. International Convention date, February 17, 1921.

A compressed mixture of coke-oven or coal gas passes downwards through a heat interchanger, and part is drawn off at an intermediate point and passed through a liquefier. The mixture passes to the base of a separating column together with the remainder of the gas from the heat interchanger. The more volatile gas passes from the separator to the space surrounding the tubes in the liquefier and thence to an expander and to the outer portion of the separator column. The liquid formed is collected in separate fractions in the separator, and the gases (hydrogen and carbon monoxide) are led into separate zones of the heat interchanger.

Specifications Accepted, with Date of Application

151,644. Reducing metallic oxides, Method of and apparatus for. A. E. Bourcoud. June 17, 1918.
153,290. Catalyser for the synthetic manufacture of ammonia. Norsk Hydro-Elektrisk Kvaelstofaktieselskab. October 28, 1919.
154,157. Plastic bodies resembling vulcanised rubber, Production of. P. Balke and G. Leysieffer. March 19, 1919.
156,116 and 156,122. Diolefines and derivatives thereof, Manufacture of. H. O. Traun's Forschungslaboratorium Ges. April 23, 1918, and December 8, 1919.
156,123. Extraction of unsaturated hydrocarbons from hydrocarbon mixtures or carbonaceous material. H. O. Traun's Forschungslaboratorium Ges. April 23, 1918.
156,124. Phosphatic manures, Manufacture of. H. O. Traun's Forschungslaboratorium Ges. November 5, 1919.
156,137. Plastic masses, Manufacture of. H. O. Traun's Forschungslaboratorium Ges. March 15, 1919.
156,138. Montan wax from bituminous coal, Extraction of. H. O. Traun's Forschungslaboratorium Ges. December 2, 1918.
156,141. Oxidising paraffin or the like and obtaining soaps therefrom. H. O. Traun's Forschungslaboratorium Ges. June 4, 1919.
156,142. Dispersoids, colloid powder, and masses therefrom, Manufacture of. H. O. Traun's Forschungslaboratorium Ges. August 29, 1918.
156,146. Oxidation of acetaldehyde to acetic acid. H. O. Traun's Forschungslaboratorium Ges. July 5, 1918.
156,147 and 156,152. Acetaldehyde or acetic acid, Manufacture of. H. O. Traun's Forschungslaboratorium Ges. September 6, 1918, and January 28, 1919.
156,148. Formaldehyde and methyl alcohol, Manufacture of. H. O. Traun's Forschungslaboratorium Ges. September 9, 1919.
156,149. Coating compositions, Manufacture of. H. O. Traun's Forschungslaboratorium Ges. April 23, 1918.
156,150. Waste rubber, Process for reclaiming. H. O. Traun's Forschungslaboratorium Ges. April 23, 1918.
156,151. Resinous condensation products or varnishes, Manufacture of. H. O. Traun's Forschungslaboratorium Ges. May 24, 1918.
156,244. Oxidation of hydrocarbons into carbonyl compounds or acids. A. Wohl. June 22, 1916.
157,746. Recovering ammonia from peat. P. Brat. July 20, 1918.
160,454. Ammonia from nitrogen or cyanogen compounds of titanium, Production of. G. P. Guignard. March 19, 1920.
164,302. Borneol, Manufacture of. Fabriques de Produits Chimiques de Thann et de Mulhouse. May 28, 1920. Addition to 144,604.
177,556-9. Protective progressive distillation and gasification of solid carbonaceous matter. G. P. Lewis. October 1 and October 28, 1920. 177,559, addition to 177,556.
177,561. Tunnel kilns. Woodall, Duckham, & Jones (1920), Ltd., Sir A. M. Duckham and A. T. Kent. October 29, 1920.
177,588. Carbonising coal and the like. E. Stansfield. December 23, 1920.
177,589. Hydrocarbon oils. Processes for treating. R. H. Brownlee and C. F. de Ganahl. December 23, 1920.
177,615. Concentrating, classifying, or separating pulverulent material. F. Ondra. January 4, 1921.
177,726. Neutral sulphate of ammonia, Manufacture of and apparatus for. South Metropolitan Gas Co. and P. Parrish. April 27, 1921.
177,736. Silicates, Process for treating. E. Levitt. June 9, 1921.
177,746. Base-exchanging compound, Manufacture of. J. Crosfield & Sons, Ltd., and H. J. Wheaton. July 5, 1921.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

LONDON, APRIL 20, 1922.

BUSINESS has been quiet this week, as could only be expected, and there is, therefore, little of fresh interest to report.

Prices are in the main unchanged, and little movement in this direction can be expected until the end of the week.

The export demand has been a shade more active, but in the main buyers' limits are rather unworkable.

General Chemicals

ACETONE continues active and firm.

ACID ACETIC continues very firm, and moves steadily into consumption.

ACID CITRIC is very scarce on the spot, and sellers have very firm ideas as to the future.

ACID FORMIC is quietly steady.

ACID LACTIC is without change, and is only in small request.

ACID OXALIC is without change in value, and British material is now obtainable at a competitive figure.

CREAM OF TARTAR is steadily called for, and the price is very firm.

FORMALDEHYDE has been featureless, with only a small inquiry.

LEAD ACETATE has been in much better request, and supplies are light.

LEAD NITRATE is quietly steady.

LITHOPONE continues in better request, and the price is very firm.

POTASSIUM CARBONATE is idle, and there is little of interest to report.

POTASSIUM CAUSTIC is without feature.

POTASSIUM PERMANGANATE passes steadily into consumption at last quoted figures.

POTASSIUM PRUSSIATE remains scarce and firm.

SODIUM ACETATE is offered at a slight reduction for forward delivery, but stocks are light.

SODIUM BICHROMATE continues in fairly steady request at last quoted figures.

SODIUM BISULPHITE is without change, and the market is firm.

SODIUM NITRITE has retained its slight improvement, and there have been a few orders.

SODIUM PRUSSIATE continues very scarce and firm.

ZINC OXIDE has not been quite so active, but the value is maintained.

Coal Tar Intermediates

BUSINESS has, of course, been somewhat broken into by the holiday, but a certain amount is passing on home and export account, and the outlook seems a little more favourable than has been the case of late. There does not seem to be quite so much inquiry about, but on the other hand what is received is more serious than was the case a few months ago.

ALPHA NAPHTHOL is without special feature.

ALPHA NAPHTHYLAMINE has been in demand on export account and is firm.

ANILINE OIL AND SALT are without change.

BENZIDINE BASE is quiet and steady.

BETA NAPHTHOL is without change in price, and some fair orders have been booked both on home and export account.

DIMETHYLANILINE has been in fair demand, and the price is firm.

DIPHENYLAMINE has been inquired for, and the price is very firm.

"H" ACID is without change, and spot supplies are very scarce.

NITRO BENZOL.—The usual home inquiries have been received.

PARANITRANILINE is steady, and regular home trade is passing, while inquiries have also been received for export.

PARAPHENYLENEDIAMINE continues firm, and orders have been booked.

PHTHALIC ANHYDRIDE has been inquired for to some extent.

RESORCIN is steady, and a few orders are in the market.

Coal Tar Products

THE market in coal tar products generally has been somewhat upset owing to the Easter Holidays intervening, but at the same time there appears to be a rather better inquiry for export, and although there is no improvement in prices, the market generally has a more cheerful tone.

90's BENZOL can be bought at 2s. per gallon f.o.r. makers' works in the North.

PURE BENZOL is in poor demand, and is worth about 2s. 6d on rails in the North, and 2s. 10d. in the South.

CREOSOTE OIL is steady at 4¼d. per gallon on rails in the North, and 5d. per gallon in the South.

CRESYLIC ACID has an improved inquiry, and is worth about 2s. per gallon on rails for the Pale quality, while the Dark quality is worth about 1s. 9d. on rails.

SOLVENT NAPHTHA can be bought at 2s. per gallon, and there is little business doing.

HEAVY NAPHTHA is also quoted at 2s. per gallon on rails.

NAPHTHALENE has a poor inquiry, and is worth about £5 to £7 per ton for the Crude quality, while the Refined is quoted at £15 per ton.

PITCH.—The market remains quiet, and prices have a slight downward tendency.

Sulphate of Ammonia

The position is unchanged. The season is coming to an end, but stocks are very limited.

Current Prices

Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	10	to	0	2	0
Acetone oil	ton	77	10	0	to	80	0	0
Acetone, pure	ton	77	10	0	to	80	0	0
Acid, Acetic, glacial, 99-100%	ton	55	0	0	to	60	0	0
Acetic, 80% pure	ton	47	0	0	to	48	0	0
Arsenic	ton	90	0	0	to	95	0	0
Boric, cryst	ton	60	0	0	to	65	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	2	to	0	2	2½
Formic, 80%	ton	72	10	0	to	75	0	0
Gallic, pure	lb.	0	3	4	to	0	3	6
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol	ton	40	0	0	to	43	0	0
Lactic, 60 vol	ton	43	0	0	to	45	0	0
Nitric, 80 Tw	ton	30	0	0	to	31	0	0
Oxalic	lb.	0	0	8½	to	0	0	9
Phosphoric, 1.5	ton	43	0	0	to	45	0	0
Pyrogallic, cryst	lb.	0	6	6	to	0	6	9
Salicylic, Technical	lb.	0	0	10½	to	0	1	0
Salicylic, B.P	lb.	0	1	4	to	0	1	6
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Tannic, commercial	lb.	0	2	9	to	0	3	0
Tartaric	lb.	0	1	4	to	0	1	4½
Alum, lump	ton	12	10	0	to	13	0	0
Alum, chrome	ton	30	10	0	to	32	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium sulphate, 17-18%	ton	13	10	0	to	14	10	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	10
Ammonia, .880	ton	35	0	0	to	37	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	90	0	0	to	95	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to		—	
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, Chlorate	lb.	0	0	11	to	0	1	0

	Per	£	s.	d.		£	s.	d.
Barium-Chloride	ton	16	0	0	to	17	10	0
Nitrate	ton	32	0	0	to	35	0	0
Sulphate blanc fixe, dry	ton	24	0	0	to	25	0	0
Sulphate, blanc fixe, pulp	ton	15	0	0	to	16	0	0
Sulphocyanide, 95%	lb.	0	1	6	to		—	
Bleaching powder, 35-37%	ton	13	0	0	to	13	10	0
Borax crystals	ton	29	0	0	to	33	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
,, ,, Grey	ton	11	0	0	to	12	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	6	10	0	to	7	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	10	6	to	0	11	0
Copper chloride	lb.	0	1	3	to	0	1	0
Sulphate	ton	28	10	0	to	29	0	0
Cream Tartar, 98-100%	ton	120	0	0	to	125	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol	ton	72	10	0	to	75	0	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	4	5	0	to	4	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols	gal.	0	2	5	to	0	2	6
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	42	0	0	to	43	0	0
Carbonate (White Lead)	ton	40	0	0	to	44	0	0
Nitrate	ton	46	10	0	to	48	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	24	0	0	to	25	0	0
Magnesium chloride	ton	10	0	0	to	10	10	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	8	0	0	to	8	10	0
Sulphate (Druggists')	ton	13	10	0	to	14	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	72	0	0	to	73	0	0
Nickel sulphate, single salt	ton	61	0	0	to	62	0	0
Ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potash, Caustic	ton	34	0	0	to	35	0	0
Potassium bichromate	lb.	0	0	7½	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride 80%	ton	15	0	0	to	20	0	0
Chlorate	lb.	0	0	4½	to	0	0	5
Meta bisulphite, 50-52%	ton	84	0	0	to	90	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	9	to	0	0	10
Prussiate, red	lb.	0	4	0	to	0	4	3½
Prussiate, yellow	lb.	0	1	2	to	0	1	2½
Sulphate, 90%	ton	20	0	0	to	22	0	0
Salammoniac, firsts	cwt.	3	5	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	26	0	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	5½	to		—	
Bisulphite, 60-62%	ton	25	0	0	to	27	10	0
Chlorate	lb.	0	0	3½	to	0	0	4
Caustic, 70%	ton	22	10	0	to	23	0	0
Caustic, 76%	ton	25	0	0	to	25	10	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	13	10	0	to	14	0	0
Nitrite, 96-98%	ton	32	0	0	to	34	0	0
Phosphate, crystal	ton	19	10	0	to	20	0	0
Perborate	lb.	0	1	0	to	0	1	1
Prussiate	lb.	0	0	9½	to	0	0	10
Sulphide, crystals	ton	13	0	0	to	14	0	0
Sulphide, solid, 60-62%	ton	21	10	0	to	23	10	0
Sulphite, cryst	ton	13	0	0	to	14	0	0
Strontium carbonate	ton	60	0	0	to	65	0	0
Strontium Nitrate	ton	60	0	0	to	62	10	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6½	to	0	1	7
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride 102 Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	35	0	0	to	40	0	0
Oxide, 99%	ton	38	0	0	to	40	0	0
Dust, 90%	ton	45	0	0	to	47	10	0
Sulphate	ton	18	10	0	to	19	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined	lb.	0	3	0	to	0	3	3
Alphanaphthylamine	lb.	0	2	0	to	0	2	3
Aniline oil, drums extra	lb.	0	1	0	to	0	1	1
Aniline salts	lb.	0	1	1	to	0	1	2
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	9	to	0	6	0
Benzidine, sulphate	ib.	0	5	9	to	0	6	0
Benzoic acid	lb.	0	1	7½	to	0	1	9
Benzoate of soda	lb.	0	1	6	to	0	1	7
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	4	9	to	0	5	0
Betanaphthol	lb.	0	1	9	to	0	2	0
Betanaphthylamine, technical	lb.	0	6	0	to	0	7	0
Croceine Acid, 100% basis	lb.	0	3	6	to	0	3	9
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	2	9	to	0	3	0
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	0	10	to	0	1	0
Dinitronaphthaline	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	5	to	0	1	6
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	2	6	to	0	2	9
Diphenylamine	lb.	0	4	3	to	0	4	6
H-Acid	lb.	0	6	6	to	0	7	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	0	to	0	6	6½
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	3	3	to	0	3	6
Naphthionate of Soda	lb.	0	3	3	to	0	3	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	9	to	0	8	6
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base	lb.	0	10	0	to	0	10	5
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	1	6	to	0	1	9
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	10	0	to	0	10	6
Para-amidophenol, hydrochlor	lb.	0	10	6	to	0	11	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled	lb.	0	10	6	to	0	10	9
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	2	9	to	0	3	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	3	to	0	7	6
Salol	lb.	0	2	4	to	0	2	6
Sulphanilic acid, crude	lb.	0	1	0	to	0	1	1
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Alsatian Potash

THE Alsace-Lorraine Trading Co. report:—During the past week there has been some indication of a slight falling off in the prices asked for muriate and sulphate of potash, but kainit 14 per cent. and sylvinite 20 per cent. and 30 per cent. remain firm, as the demand for these qualities is well maintained. Stocks in the hands of merchants are short, but cargoes are coming forward regularly and a large tonnage is being forwarded direct from the ports to the farmers' stations. Unit prices are now on the following basis for supplies sent f.o.b. in bags:—

	s.	d.	
French Kainit 14%	3	9	per unit
Sylvinite 20%	3	7	,, ,,
Sylvinite 30%	3	9	,, ,,
Muriate of Potash 50%	4	2	,, ,,
Sulphate of Potash 48%	6	0	,, ,,

Recent Wills

Mr. William Sloane, The Beeches, Moore, Chester, chairman of the Mersey White Lead Co., Sankey Bridges, Warrington £42,833

Mr. Edward John Neale, 120, Fortswood Road, Southampton, lead and glass merchant.. £35,537

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

GLASGOW, APRIL 19, 1922.

THE amount of business transacted during the past week left much to be desired.

Market values generally are fairly steady, and there is nothing of importance to note.

Continental offers are inclined to be slightly higher, owing, no doubt, to the slight appreciation of the German mark.

In coal tar and wood distillation products there is nothing of interest to report.

Industrial Chemicals

ACETONE.—American quotations of £60 to £61 per ton, c.i.f. U.K. Spot market firm.

ACID ACETIC.—Prices well maintained. Glacial quoted £60 to £61 per ton; 80% pure £48 to £49.

ACID BORACIC.—Usual local demand for small lots. Crystal or granulated, £60 per ton. Powdered, £62 per ton.

ACID HYDROCHLORIC.—Makers' price unchanged, and demand still very poor. Price 6s. 6d. per carboy ex works.

ACID, NITRIC.—80° Tw., inquiries for home, £28 per ton delivered. 84° Tw., inquiry for export, £37 per ton, f.o.b. English port, carboys included.

ACID OXALIC.—Market steady at 8½d. per lb.

ACID SULPHURIC.—144°, £4 per ton; 168°, £7 5s. per ton; dearsenicated, £1 per ton more.

ALUM POTASH (LUMP).—Fair inquiry and price unchanged. £15 5s. ex store. Continental offers of £14 per ton c.i.f. U.K.

ALUMINA SULPHATE.—Very little inquiry. Spot lots of 14/15% about £13 to £14 per ton.

AMMONIA CARBONATE.—Quoted about 4d. to 4½d. per lb. A few inquiries but little business.

AMMONIA LIQUID, 880°.—Practically no demand. Quoted 2¾d. to 3d. per lb.

AMMONIA MURIATE.—Makers' price unchanged at £34 per ton, f.o.r., but cheaper spot lots available.

AMMONIA SALAMMONIAC.—Crystals, £58 per ton.

AMMONIA SULPHATE.—Supplies for prompt delivery very scarce; 25¼%, £15 10s. per ton; 25¾% neutral, £16 13s. ex works April/May delivery.

ARSENIC, WHITE POWDERED.—Very little demand and cheaper quotations. £39 to £40.

BARIUM CHLORIDE.—Quoted at about £16 10s. per ton ex quay, but little business passing.

BARYTES.—Prices remain steady. Finest white quality, £6 per ton, f.o.r.; grey, £4 per ton.

BLEACHING POWDER.—Rather better inquiry. Price £14 per ton, ex station. Cheap Continental offers.

BORAX.—Crystal or granulated, £29 per ton; powdered, £30 per ton, ex station.

CALCIUM CHLORIDE.—English make, £6 10s. per ton ex quay; Continental offers of £5 10s. per ton c.i.f. U.K.

COPPER SULPHATE.—In fair demand. Quoted £28 to £29 per ton. Cheaper prices for forward delivery.

COPPERAS, GREEN.—Price about £4 per ton f.o.r.

DECOLOURISING CARBON.—£75 per ton, f.o.r. works.

EPSOM SALTS.—Commercial, £9 5s.; B.P., £10 10s. per ton. delivered. Fair inquiry.

FORMALDEHYDE.—Inquiry for home. £76 per ton delivered, casks included.

GLAUBER SALTS.—In moderate request. Price, £5 10s. to £6 per ton.

KIESELGUHR.—Small inquiry. Price, £11 10s. c.i.f. U.K. port.

LEAD ACETATE.—Practically no demand. Brown quoted, £32 to £33 per ton; white, £41 to £42 per ton.

MAGNESITE.—Demand still very poor. Price, £12 per ton, ex store.

MAGNESIUM CHLORIDE.—Spot lots available at £8 per ton ex store. Continental offers inclined to be higher at £7 per ton, c.i.f. U.K.

NAPHTHALENE.—Sublimed flakes quoted £16 per ton f.o.r. works. In moderate request.

NITRE CAKE.—Export inquiry. £3 10s. f.o.b. English port, casks included.

POTASSIUM BICHROMATE.—Makers' prices unchanged at 6¾d. per lb. Spot lots to be had at 6½d.

POTASSIUM CARBONATE, 90/92%.—Very poor demand. Spot lots quoted £26 per ton.

POTASSIUM CAUSTIC, 88/92%.—Spot lots quoted £33 to £34 per ton. Continental offers of £30 per ton c.i.f.

POTASSIUM CHLORATE.—Price unchanged at 4½d. per lb.

POTASSIUM NITRATE (Saltpetre).—Usual small local demand. Price £37 to £38 per ton ex store.

POTASSIUM PERMANGANATE.—Export inquiry. 9½d. per lb. f.o.b. U.K.

POTASSIUM PRUSSIATE.—Yellow, a few inquiries. Price 1s. 2d. per lb.

PYRITES (non-cupreous).—Norway offering at 8¼d. per unit, c.i.f. U.K.

SALICYLIC ACID.—B.P. 1s. 6d. per lb. delivered, packages free. Few inquiries.

SODIUM BICARBONATE.—£11 per ton ex station. M.W. quality, £1 per ton less.

SODIUM BICHROMATE.—Makers' price unchanged, 5½d. per lb. Spot lots on offer at 5⅝d.

SODIUM CAUSTIC.—76/77%, £25 10s.; 70/72%, £23 10s.; 60% £26 5s.; 98/99% powdered, £29 to £30. Still in little demand for home consumpt, but fair inquiry for export.

SODIUM HYPOSULPHITE.—Slight inquiry for small lots. Commercial, £14 to £15 per ton. Pea crystals, £21 per ton, ex store.

SODIUM NITRATE.—Price unchanged: 95%, £15 per ton; 96% Refined quality, £15 5s. per ton. Forward shipment offering at less money.

SODIUM SILICATE, 140°.—Fair inquiry, but little actual business. Price, £10 to £11 per ton.

SODIUM SULPHATE (Saltcake 95%).—Price unchanged at £4 per ton. Slightly cheaper lots on offer.

SODIUM SULPHIDE, 60/62%.—A few inquiries. Quoted at £19 10s. to £20 per ton. Cheaper Continental offers at £18 10s. c.i.f.

SULPHUR.—A few inquiries for Roll, but other qualities in poor demand. Flowers, £14; Ground, £13; Rock, £12; Roll, £13; ex store. American offering for forward at £4 15s. ex wharf. Sicilian Seconds offering at £6 13s. 6d. c.i.f. U.K.

SULPHURYL CHLORIDE.—Inquiry for Home Trade. 2s. 3d. per lb., jars in cases included.

ZINC CHLORIDE.—Solid. Quoted at £38 per ton.

NOTE.—The prices quoted are for bulk business and must not be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

CASSELLA F. ACID.—Home inquiry. Price 10s. 6d. per lb. 100% basis carriage paid.

DIMETHYLANILINE.—Home inquiries. Price 2s. 8¾d. per lb. carriage paid.

DINITROCHLORBENZOL.—Export inquiries. £90 per ton f.o.b. U.K.

DIPHENYLAMINE.—Home inquiry. Price 4s. 3d. per lb. delivered.

METANITRANILINE.—Home inquiry. Price 5s. 5d. per lb. delivered.

PARANITRANILINE.—Export inquiry. Price 3s. 6d. per lb. f.o.b. U.K.

PARANITROPHENOL.—Small home inquiry. Price 2s. 2d. per lb. 100% basis f.o.r. makers' works.

Catalogue Received

NECOL INDUSTRIAL COLLODIONS, LTD.—The various uses to which nitro-cellulose preparations may be put in treating leather are described in a booklet issued by Necol Industrial Collodions, Ltd., a constituent company of Nobel Industries, Ltd. It sets forth the technical application of the many "Necol" products, from enamel to plastic wood. Readers of THE CHEMICAL AGE may obtain a copy of the booklet on application to the company's offices at 62, London Wall, London, E.C. 2.

German Chemical Trade Notes

FROM OUR OWN CORRESPONDENT

Berlin, April 16, 1922.

THE dominant features on the German chemical market are the scarcity of money and of goods. Chemical industry in this country seems to be suffering chiefly from its own youth and lack of organisation, for, strange as it may seem, there was no real chemical trade in pre-war Germany, as the powerful chemical manufacturers cultivated the practice of selling direct to the consumer. The post-war development of a merchanting trade has been slow owing to prevailing conditions, and to the reluctance of the manufacturers to relinquish their direct trading methods.

The undertone on the market for industrial chemicals has been firm, although prices have been somewhat irregular; no serious declines in values were observed, and, on the other hand, the general upward movement of prices seems to have received a slight check. The price of sulphuric acid has recently been advanced by the makers.

As a result of rapidly increased prices in coal tar products, the domestic market has been quieter; export trade, however, has improved.

The report regarding an alliance between La Compagnie Nationale des Matières Colorantes et des Produits Chimiques and the Interessengemeinschaft which appeared in certain English newspapers seems to be quite unfounded. It is reported that the Chemische Fabrik Griesheim Elektron have just sold one of their patents to America; this statement has not been confirmed. The dividends paid and profits made by the chief dyemaking firms for 1921 are as follow: Hoechster Farbwerke, 30 per cent. (1920, 20 per cent.); net profit, 175,770,000 marks; (1920, 64,540,000 marks). Friedrich Bayer, 30 per cent. (1920, 20 per cent.); net profit, 201,425,146 marks (1920, 65,009,384 marks). The Badische Co. is paying a dividend of 30 per cent., and the Griesheim Elektron, 27 per cent.

The following quotations are given in marks per kilogram (d. = domestic price; e. = export price):

ACIDS.—Acetic, 50%, 18 mk. d; 80%, very scarce at 35 mk. d.; 45 mk. e.; glacial, 98/100%, 63/65 mk. e. Acetyl-Salicylic, 300 mk. d.; 350 mk. e. Benzoic, 110 mk. d.; 130 mk. e. Boric, 94.50/96.25 mk. d. Citric, 320 mk. d.; 340 mk. e. Formic, exceedingly brisk demand is meeting with hardly any offerings; unimportant small parcels changed hands at 28.50 mk. d. Oxalic, 98/100%, 46 mk. d.; 78 mk. e. Salicylic, 150 mk. d.; 170 mk. e. Sulphuric, new prices, valid from April 1; producers' price for 100 kg., 60° Bé, 147.40 mk.; market price 172.40 mk. Tartaric crystallised and powdered, 155 mk. d.; 200 mk. e.

INDUSTRIAL CHEMICALS.—Alum: in strong demand but very scarce; chrome, 15%, 36 mk. d.; 42 mk. e.; potash crystal powder, 10 mk. d.; 13 mk. e.; potash in lumps, 12 mk. d. Alumina sulphate, 14/15%, 4.80 mk. d.; 8.75 mk. e.; 17/18%, 11.75 mk. e.; in good demand for export. Ammonium Carbonate, powdered, 19.50 mk. d.; 30/31.50 mk. e.; in fair demand; lumps very scarce at 40 mk. d. Barium Chloride, 27 mk. e. Bleaching Powder, 80%, 8 mk. d.; 14.50 mk. e. Calcium Chloride, 70/75%, 6.50 mk. d. Copperas, 4.75 mk. d.; 6.75 mk. e. Copper Sulphate, 37/40 mk. d. Glauber's Salt, coarse crystallised, only obtainable in small parcels at 3.60 mk. d.; 4 mk. e. Magnesium Chloride, fused, 6.35 mk. e. Potassium Carbonate, 96/98%, 28.50 mk. d.; 42 mk. e. Potassium Caustic, 88/92%, 30/32 mk. d.; 40 mk. e.; liquor, 13.75 mk. d.; 21 mk. e. Potassium Chlorate, 32 mk. d.; 38 mk. e. Potassium Metabisulphite: in strong demand; supplies scarce at 52/54 mk. d.; 60 mk. e. Potassium Permanganate in fair request at 75 mk. d.; 85 mk. e. Salt Cake, 4 mk. d.; 6 mk. e. Soda, crystallised, 7 mk. d. Soda Ash, 14.50 mk. d.; in good demand. Sodium Caustic, 33/35 mk. d.; 33 mk. e.; liquor, 38/40°, 11.50 mk. d. Sodium Silicate, 38/40° Bé, 5 mk. e. Sodium Sulphide, 60/62%, is extremely scarce, odd small parcels which are offered are sold immediately at 23/26 mk. e.; Zinc Chloride, 22 mk. e. Benzaldehyde, 85 mk. d.; 100 mk. e. Naphthalene, pure, in balls, 18.50 mk. d.; 19.50 mk. e.; flakes, 17.50 mk. d.; 18.50 mk. e. Bone Glue, 62 mk. d. Cobalt Oxide, R. K. O., in good demand at 1,000 mk. d. Lead, Red, 40 mk. d.; 44 mk. e. Lead, White, powdered, 42 mk. d.; 45 mk. e.; in oil, 42 mk. d. Litharge, 39.50/41 mk. d.; 43 mk. e. Lithopone, Red Seal, 30%, 18 mk. d.; 25 mk. e. Skin Glue, 78 mk. d. Zinc White, Red Seal, 38/40 mk. d.; 44/52 mk. e.; Green Seal, 37 mk. d.; 44 mk. e. Potassium Bichromate, 66 mk. d.; 78 mk. e. Potassium Prussiate, yellow, 165 mk. d.; 180 mk. e.; red, 300 mk. d. Sodium Hyposulphite, crystallised, technical, 14 mk. d.; 19 mk. e.

Nitrate of Soda Position

IN their circular, dated April 18, Aikman (London), Ltd., state: The arrivals amount to about 15,000 tons, and about 10,000 tons are due during the next fortnight. The tone has been very quiet throughout the fortnight under review, owing to the unusually severe weather in Europe checking the demand from consumers, and sales by the "pool" only amount to about 25,000 tons. Continental markets have been influenced by a fair amount of re-sales, but at the close it is reported that these have been largely absorbed, and with better weather now ruling a good demand appears imminent. The European deliveries for first half April amount to about 75,000 tons against 95,500 tons for the whole of April last year, and visible supply for Europe at 15th inst. was about 450,000 tons, of which it is estimated that about 80,000 tons have been sold for early delivery. In the United States the demand continues good, and several parcels have been bought from the Producers' Association for shipment to that market, in addition to some 15,000 tons transhipped by the "pool," ex their European stocks. It is also reported that the American Government have agreed to release 40,000 tons of their reserve stock (estimated at 210,000 tons), for immediate delivery, under conditions, which may require buyers to return part of same to the Government later in the year, and negotiations are now proceeding for the disposal of this. At closing 11,000 tons are reported to have been sold. In f.o.b. a re-sale parcel of April shipment was reported sold at 10s. 10½d., and several other lots were sold by the Producers' Association at 11s. per quintal, making the total sales by that body up to date 64,000 tons. In further forward July refined was reported sold at 9s. 4d. to 9s. 6½d., and July-December refined at 9s. 4d. per quintal. Discussions continue as to the prices which the Producers' Association will fix after June, and at a meeting held in London on 7th inst. the English companies, representing about 27 per cent. of the Associated Producers, passed a resolution unanimously recommending not less than 9s. 6d. for July, ranging up to 10s. 6d. per quintal for next season shipment. The German producers, represent- about 14 per cent., on the other hand are expected to vote in favour of a considerably lower price, whereas the Chilean producers, representing 59 per cent., appear to have an open mind at present.

Production of Chilean Nitrate

ACCORDING to a report from the acting British Consul at Antofagasta, the production of nitrate during the latter half of 1921 reached only 429,932 tons, or about 35 per cent. of that for the corresponding period of 1920. Consumption for the same period was estimated at about 249,000 tons, or 30 to 35 per cent. of that in normal pre-war times. Exports of nitrate during the period under review amounted to 323,447 tons, as against 1,246,490 tons in July-December, 1920. Of the exports for the five months July-November (for which alone detailed figures are available), 60 per cent. went to Europe or Egypt and 24 per cent. to the United States. In reply to an inquiry from the Chilean Government the Nitrate Pool have given the following figures of the stocks held by them:

Total stock held, 734,500 tons, apart from about 90,000 tons afloat and 6,000 tons to be embarked. The distribution of stocks was as follows:

United Kingdom, 82,000; France, 260,000; Belgium, 210,000; Holland, 72,000; Germany and Baltic countries, 61,000; Scandinavia, 10,000; Spain, 20,000; Italy, 8,000; Egypt, 2,000; Mauritius, 500; total, 725,500 tons.

Rio de Janeiro Exhibition

AMONG the important British manufacturers to be represented at the Rio de Janeiro Exhibition, which opens on September 7 next, will be Nobel Industries, Ltd., who have notified the Board of Trade of their intention to support the British Section which is being organised by the Department of Overseas Trade. The Nobel exhibits will include commercial explosives and accessories, industrial collodions, ammunition, smokeless powders and gunpowder, engineering products, incandescent mantles, gold and aluminium bronze powders, pure metal alloys, welding compounds, &c. A range of Nobel products similar to those which will be sent to Rio de Janeiro is already installed for the inspection of visitors at the British and Latin American Chamber of Commerce, 39, Bedford Square, London.

Company News

MIAMI COPPER CO.—A quarterly dividend of 50 cents per share is payable on May 15.

INTERNATIONAL NICKEL CO.—A quarterly dividend of 1¾ per cent. on the preferred stock is payable on May 1 to holders of record April 18.

WEARDALE LEAD CO., LTD.—Although the results for the half year to March 31 are more favourable than in the previous twelve months, the directors do not feel justified in paying an interim dividend.

MANGANESE BRONZE AND BRASS CO.—The profit for 1921 was £16,171. After writing off the balance of the expenses of the debenture issue, £2,000, and paying a dividend on the preference shares, £10,126, there remains £4,045, and £13,941 was brought in, making £17,986, which the directors propose to carry forward. The annual meeting will be held at 36, Walbrook, London, on April 25, at 2.30 p.m.

LIMNER AND TRINIDAD LAKE ASPHALT CO., LTD.—A Stock Exchange announcement states that dealings in 24,500 ordinary shares of £1 each fully paid, Nos. 250,001 to 274,500 have been specially allowed by the committee under Rule 148A. These securities will rank *pari passu* with those in which special settling days have already been appointed as soon as they are identical and the certificates are ready for distribution, and with those for which an official quotation has already been granted as soon as they are identical and are officially quoted.

JOSEPH NATHAN & CO., LTD.—The net profit for 1921 was £82,447; £73,546 was brought in, making a total of £155,993. The directors recommend a final dividend on the preferred ordinary shares, making 10 per cent. for year, less tax, and a final dividend on ordinary shares, making 10 per cent. for the year, less tax; provision for contingencies, £25,000; forward, £86,076. The annual meeting will be held at 56 Osnaburgh Street, London, on April 27, at 11 a.m. An extraordinary general meeting will follow, at which a resolution to increase the company's capital to £1,500,000 by the creation of 450,000 new shares of £1 each will be moved.

UNITED ALKALI CO., LTD.—The accounts for the year 1920 show a profit of £150,436. To this are added £65,696, brought in, and £100,000 for special reserve fund, making a total of £316,132, which has been dealt with as follows: dividend for 1920, after income-tax deduction, on preference shares at 7 per cent., £138,437; on the ordinary shares at 1s. per share, £21,000, leaving to be carried forward to 1921, £156,695. The directors regret their inability at the moment to present the accounts for 1921. They also regret their inability to distribute the full 7 per cent. per annum dividend on the preference shares, but recommend on the £10 cumulative preference shares a dividend of 4s. per share, less tax, making, with the interim dividend paid in January last, a dividend of 4 per cent. per annum, less tax, on account of the 7 per cent. per annum due for the year. The adjourned meeting will be held at the Law Association Rooms, 14, Cook Street, Liverpool, on April 25, at 2 p.m.

France and German Dyes

ACCORDING to the *Times* Paris correspondent, the report (published in certain sections of the Press) that there has been an arrangement between the French and German dyestuff companies can be confirmed, but that the agreement is not of the sweeping character at first reported.

His explanation is that during the war French dyemakers, who were thrown back on their own resources, were compelled to exploit German patents, and in the course of their work were able to discover various secrets of the German dyemakers. While the war lasted all these patents were, of course, used without payment, but when peace was restored the question of payment at once arose, and there has been a good deal of uncertainty about the exact legal rights of the two parties. To put an end to this state of uncertainty a number of licences have been bought from the big German dye trust by the French. The agreement for the purchase of the licences contains no undertaking on the part of the French to restrict their exports of dyestuffs and no promise to pay half their profits to the Germans, nor are German chemists to be sent to France to superintend the use of the processes which these licences permit. In cases where it may be necessary, French representatives will go to Germany to study the working of the processes.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. No.
Persia	Perfumery, drugs, &c.....	421
Belgium	Non-ferrous metals, soap, &c.....	412
Italy	Soya beans, wood pulp, chemicals	414
Brazil	Potash, caustic soda.....	428
Vancouver ..	Druggists' sundries	403
New Zealand	Glass bottles	437
Uganda	Soap-making machinery	—
Barcelona....	Gums, resin, shellac, wax, vegetable dyeing and tanning materials	445
Stockholm ..	Oils and commodities for soap industry	446
Buenos Aires	Heavy chemicals	451

Tariff Changes

DANZIG.—Import duties on cement, toilet and medicinal soaps, paints, and lithopone are reduced by 50, 25, 25, and 50 per cent. respectively. The maximum quantities allowed to be imported at these reduced rates are 10,000 tons, 6 tons, 50 tons, and 2 tons (all metric).

CUBA.—A Bill for the establishment of a new Customs Tariff for Cuba may be passed into law and come into immediate operation. The duties in the proposed new tariff are, in general, from 20 to 25 per cent. higher than those of the present tariff. The duties on certain produce competing with products of local industry, such as beer and soap, will be considerably extended, the proposed new duties being twice or thrice as high as those at present in force.

GREAT BRITAIN.—Open general licences have been issued permitting (1) The export to all destinations of sulphate of ammonia; and compound manures having sulphate of ammonia as their only export prohibited constituent; (2) The export to the Channel Islands of basic slag, superphosphate of lime and compound manures containing either basic slag or superphosphate of lime.

UNITED STATES OF AMERICA.—Among the important new tariff developments it is reported that duties of 7 cents a pound specific and 50 per cent. *ad valorem* will be placed on coal tar products entering the United States. Colours, dyes, stains and coal tar derivatives will be subject to a duty of 60 per cent. *ad valorem* and 7 cents a pound.

Funeral of Sir John Benn

THE funeral of Sir John Benn took place on April 13 at Limpsfield, Surrey, the first portion of the service being held in the Oxted Congregational Chapel. The Rev. B. J. Snell and the Rev. W. Rix officiated, and among those present were Sir Ernest Clarke and Sir Arthur and Lady Spurgeon. Simultaneously with the Oxted ceremony a Memorial Service was held at Christ Church, Westminster Bridge Road, London, at which Dr. F. B. Meyer, the Rev. J. D. Jones and the Rev. W. S. Poole officiated. Among those present were the Marquis of Lincolnshire, Lord Riddell, Sir Godfrey Baring, Mr. John Burns, Mr. F. R. Anderton (Chairman of the L.C.C.), with many members of the Council, Mr. John Ames, Sir Stephen Collins, Sir Clement Kinloch-Clarke, Mr. C. W. Bowerman, M.P., and members of the firm and staff of Benn Brothers, Ltd.

German Dyes in Italy

THE Washington correspondent of the *Journal of Industrial and Engineering Chemistry* states that an interesting development in connexion with the activities of the German Chemical Cartel has been brought to the attention of American officials in a confidential report recently received. It appears that Herr von Weinberg has made an arrangement with one of the Italian dye-works by which it is agreed to furnish intermediates so that the Italian company can eventually supply Italian dyestuff needs.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

ACTE & CO., LTD., 70, Newman Street, London, chemical merchants, £42 8s. 10d. February 17.

ARMITAGE, J. C., 30, Eastwood Mount, Clifton, Rotherham, chemist, £14 15s. 2d. February 10.

BLACK, A. E., 8, Crouch End Hill, London, chemist, £18 15s. 6d. February 14.

BURNS, J. Harris, High Street, Highley, chemist, £37 18s. 3d. February 10.

FLOREY, Hartley, 45, Great Tower Street, London, chemical and general merchants, £11 6s. 8d. February 17.

JAMES, H. P., Tudor Square, Tenby, chemist, £10 8s. 3d. February 18.

JEFFS BROTHERS, Gordon Lane Works, Bootle, metal polish manufacturers, £16 15s. 7d. February 14.

SAVAGE, Herbert, 187, Sutherland Avenue, Maida Vale, London, chemist, £16 12s. February 20.

STANFIELD, J. L., Boothfold, Waterfoot, chemical manufacturer, £21 4s. February 17.

WARNEFORD-BELL, James Henry, 108, Crackenedge Lane, London, manufacturing chemist, £37 5s. 4d. January 18.

Bill of Sale

[*The undermentioned information is from the Official Registry It includes Bills of Sale registered under the Act of* 1882 *and under the Act of* 1878. *Both kinds require re-registration every five years. Up to the date the information was obtained it was registered as given below; but payment may have been made in some of the cases, although no notice had been entered on the Register.*]

BLUNT, Henry Rowland, 47, Finnemore Road, Little Bromwich, and 70, Snow Hill, Birmingham, chemist. April 13. £50.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of* 1908, *provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BURY (J.), LTD., Manchester, chemists.—Registered April 4, £2,000 debentures; general charge. *Nil. September 6, 1920.

Satisfactions

BRITISH CELLULOSE & CHEMICAL MANUFACTURING CO., LTD. (late BRITISH CELLULOSE & CHEMICAL MANUFACTURING (PARENT) CO., LTD.), London, S.W.—Satisfaction registered April 6. Trust deed securing £2,000,000 debentures stock registered May 16, 1919, satisfied by the discharge of the deed on March 9, 1920, no debenture stock having been issued thereunder.

DAVISON (H.) & SONS, LTD., Liverpool, paint manufacturers. —Satisfaction registered April 6, all moneys, &c. registered October 29, 1918.

London Gazette

Companies Winding Up Voluntarily

WALKER DYEING CO., LTD. G. H. C. Davies-Higgins, of Fuller, Higgins & Co., 39, Albion Street, Leeds, appointed liquidator.

ROBARTES, LTD. J. Butler, 26, East Parade, Leeds, appointed liquidator. Meeting of creditors at Diadem House, Leather Lane, London, E.C., Friday, April 21, 3.30 p.m.

Liquidator's Notice

BRYANT, C. H., LTD. (in voluntary liquidation). Particulars of claims to C. A. Radermacher, 36, Camomile Street, London, E.C. 3, by May 1.

Bankruptcy Information

BURNS, John Harris, High Street, Highley, co. Salop, chemist. First meeting, April 21, 3 p.m., Lion Hotel, Kidderminster. Public examination, May 2, 2.45 p.m., Town Hall, Kidderminster.

HALL, Howard Ephraim, 41, George Street, Luton, under the style of HALL & SON, chemist and druggist. First Meeting, April 25, 11.30 a.m., 11, George Street West, Luton. Public examination, May 4, 11.15 a.m., Court House, Luton.

LEWIS, John Gardner, 31, Florence Road, Acock's Green, Birmingham, varnish manufacturer. Receiving order, April 10. Creditor's petition. First meeting, April 28, 11 a.m. Official Receiver's Office, Ruskin Chambers, 191, Corporation Street, Birmingham. Public examination May 10, 2.30 p.m., Court House, Corporation Street, Birmingham.

Application for Discharge

ASHCROFT, Frank, in co-partnership with T. H. Lewis, under the style of LEWIS & CO., at 176, Moss Lane East, Manchester, and 5, Chapman Street, Hulme, Manchester, manufacturing chemist. Hearing, May 10, 10.15 a.m., Court House, Quay Street, Manchester.

New Companies Registered

ELSTREE CHEMICAL WORKS, LTD., Imperial Buildings, Ludgate Circus, London. Manufacturers of and dealers in nitrogenous fertilisers, nitrolim, calcium carbide, ammonia, nitric acid, and other chemicals. Nominal capital, £20,000 in £1 shares (4,000 10 per cent. preference; 1,750 "A" ordinary, and 14,250 "B" ordinary).

LONDON HYGIENIC CHEMICAL CO. (1922), LTD., 5, Wine Office Court, Fleet Street, London. Manufacturers of, and dealers in, toilet requisites, disinfectants, &c. Nominal capital, £15,000 in 14,000 10 per cent. participating preference shares of £1 each, and 20,000 ordinary shares of 1s. each.

LUCIDON, LTD. French polish manufacturers. Nominal capital, £1,150 in 2,000 "A" shares of 10s. each, and 3,000 "B" shares of 1s. each. A subscriber: C. Russell, 221, Hampton Road, Ilford, Essex.

MALLOW PROPRIETARIES, LTD., 9, Sherwood Street, Westminster, London. Manufacturing chemists, &c. Nominal capital £1,000 in £1 shares (250, 10 per cent. preference).

JOHN WADDINGTON & SONS, LTD., Prudential Buildings, 20, Park Row, Leeds, importers and exporters of oil, tallow and stearine. Nominal capital £5,000 in £1 shares.

WALKERS PAINTS, LTD., 59, Wandsworth Road, London. Manufacturers of white lead, zinc white, paints, oils, &c. Nominal capital, £2,500 in £1 shares.

WHITEHEAD, KEMP & CO., LTD. Dyers, bleachers, makers of vitriol, &c. Nominal capital, £10,000 in £1 shares. A director: J. Barker, 77, Market Street, Bradford.

RICHARD WHITTAKER, LTD., Victoria Works, Midland Street, Ardwick, Manchester. Gum and starch manufacturers and merchants. Nominal capital, £5,000 in £1 shares.

Mineral Filler Investigations in U.S.A.

ELUTRIATIVE tests have been made at the Southern Experiment Station of the Bureau of Mines, Birmingham, Ala., on certain materials, such as silica, tripoli, bentonite, fuller's earth waste, infusorial earth, ochre, slate flour, whiting, talc, pyrophyllite, and mixtures of non-metallic minerals. Microscopic slides have been made for the purpose of counting the grains. An air separator has been devised for the classification of finely ground materials. Oil absorption tests have been made on several ochres, on marble whiting, and on clays under varying degrees of temperature. A colour scheme has been prepared for the comparison of clays. It has been shown that the lower grades of graphite can be purified by the Trent process, thus rendering them suitable for lubrication purposes.